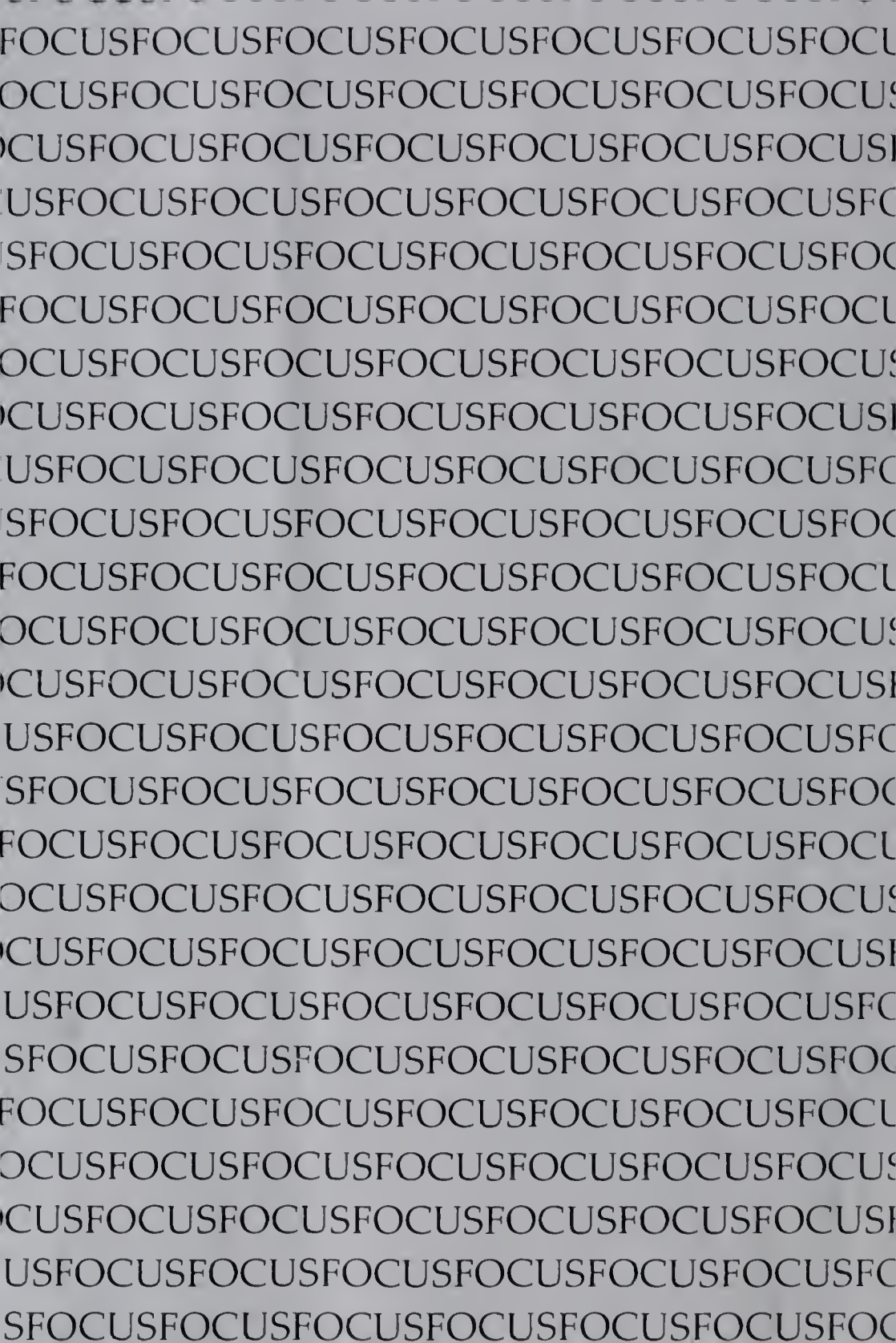
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REPORT

OF

SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR

For the Period 1924-1928

HARLOWE M. STAFFORD,
Water Supervisor

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ACKNOWLEDGMENTS

Acknowledgments are due to the able and efficient assistance of the engineers as listed under the organization statement who have been employed on this work for portions of or throughout the five-year period covered by this bulletin.

The cooperation and contributions to the work of various state and federal agencies are to be commended. These have included the Water Resources Branch of the U. S. Geological Survey, through H. D. McGlashan, District Engineer; the U. S. War Department, Corps of Engineers, through Colonel U. S. Grant and Major C. S. Ridley, District Engineers, Second District; the U. S. Department of Agriculture, Division of Agricultural Engineering, through W. W. McLaughlin, Associate Chief; and the University of California Agricultural Experiment Station through Frank Adams, Professor of Irrigation Investigations and Practice.

An expression of appreciation for their splendid cooperation is also due the various engineers, water superintendents and water users themselves throughout the territory covered by this work.

ADVISORY COMMITTEE

PERMANENT COMMITTEE OF THE SACRAMENTO-SAN JOAQUIN RIVER PROBLEMS CONFERENCE

The successful prosecution of the Water Supervisor's work and collection of the records included herewith, vital in an orderly procedure looking to a solution of the river problems, may be attributed in no small measure to the backing, advice and continued interest and cooperation of the Permanent Committee of the Sacramento-San Joaquin River Problems Conference.

This committee, directly representative of the water users and other interests involved, was appointed by the First Sacramento-San Joaquin River Problems Conference in January, 1924, and through its activity the appointment of a water supervisor was made by the former Division of Water Rights in June, 1924, in accordance with the Water Users' Agreement of that year. The present personnel of the committee is as follows:

HERBERT E. WHITE, Acting Chairman----------Sacramento

E. L. ADAMS, Chico	MANLEY S. HARRIS, San Francisco
A. E. ANDERSON, San Francisco	W. I. HECHTMAN, Sherman Island
ALDEN ANDERSON, Sacramento	WARREN H. MCBRYDE, San Francisco
G. A. ATHERTON, Stockton	R. V. MEIKLE, Turlock
P. M. DOWNING, San Francisco	JESSE POUNDSTONE, Grimes
WILLIAM DURBROW, Willows	F. T. ROBSON, Vina

ORGANIZATION

B. B. MEEK ..... *Director of Public Works*

EDWARD HYATT ..... *State Engineer*

HAROLD CONKLING ..... *Deputy in Charge of Water Rights*

HARLOWE M. STAFFORD
Sacramento-San Joaquin Water Supervisor

MARTIN H. BLOTE (1924 to date) ..... *Assistant Water Supervisor*

D. S. HAYS (1924–25–26) ..... *Assistant Hydraulic Engineer*

S. M. MUNSON (1924–26–27) ..... *Assistant Hydraulic Engineer*

JAMES M. BROCKWAY (1927 to date) ..... *Assistant Hydraulic Engineer*

BISCOE KIBBEY (1928) ..... *Assistant Hydraulic Engineer*

E. W. CASE (1925) ..... *Junior Hydraulic Engineer*

DELTA COOPERATIVE INVESTIGATION

W. W. MCLAUGHLIN ..... *Associate Chief, Division of Agricultural Engineering, U. S. Department of Agriculture*

O. V. P. STOUT (1924 to date) ..... *Hydraulic Engineer*

LLOYD N. BROWN (1924 to date) ..... *Assistant Hydraulic Engineer*

FRANK DAVIS (1925–1927) ..... *Assistant Hydraulic Engineer*

A. M. WELLS (1924) ..... *Assistant Hydraulic Engineer*

A. A. YOUNG (1928) ..... *Assistant*

FOREWORD

The publication of this bulletin marks the completion of five seasons' work under the Water Supervisor Plan in the Sacramento-San Joaquin territory. This work had its inception in the unusually short water year of 1924. Its immediate status was that of an emergency measure effected by the water users themselves to tide over the critical situation of that year. However, there was an underlying and more fundamental conception that, by its inauguration, a definite and necessary step was being taken toward the ultimate solution of the water difficulties in the territory involved. Of first importance in that solution comes conservation, both by careful use of existing natural flow and by storage of flood flows. But to attain effective conservation there must be an authoritative, orderly and equitable distribution of the water supply to those entitled to receive it. Such distribution requires as a basis either an adjudication of water rights or a mutual agreement and stipulation, either temporary or permanent, among the water users. In working out an adjudication or mutual agreement there are certain facts and data which are indispensable, namely, the records of the diversions and uses of water, and the pertinent hydrographic data on stream flow, return flow, duty of water, etc.

In the Sacramento-San Joaquin area there has been no adjudication of rights and due to the complicated nature of the situation it would appear that the ultimate distribution of water may be most satisfactorily based upon mutual stipulation, perhaps temporary at first but ripening to permanent adjustment and agreement, similar to the outstanding example on Kings River.

In preparing the way for this solution, then, the value of the work commenced in 1924 and continued to date is evident. Through the office of the Water Supervisor of the Division of Water Resources, all diversions of water have been measured, the stream flow and return flow have been recorded and duty of water and salinity investigations pursued. The results of this work have been reported annually in mimeograph form but for purposes of preservation and wider distribution it is felt they should be brought together in a printed publication, and that is the purpose of this bulletin.

In addition to the engineering investigation, collection of records, etc., the office of Water Supervisor has been of noteworthy service in effecting conservation and waste prevention measures in the seasons of low flow. In respect to this and to actual stream administration the water supply of two seasons, 1924 and 1926, has been such as to urgently require the efforts that have been made and in the seasons of 1925, 1927 and 1928, the urgency has not been so great. As the work in each season has progressed, however, the water users, both upstream and in the delta, have become better acquainted with the methods adopted and in doing so have more readily extended their cooperation. A practical demonstration has been made that with each water user

doing his reasonable share or perhaps making some sacrifice, situations which otherwise might prove critical, may be successfully relieved, thereby effecting the maximum benefit to the greater portion of the territory involved. With a more intimate knowledge of the Water Supervisor procedure on the part of the water users, and with the addition to the record each year of the valuable facts as to the uses of water, stream flow, etc., the Division of Water Resources through the Water Supervisor becomes more and more prepared and ready to initiate (upon short notice in case of water shortage) some schedule or plan to be mutually agreed upon by the water users, for the most equitable and efficient administration of the water.

CHAPTER I

INTRODUCTION AND RESUME

Purpose.

The purpose of this bulletin is to make of record the measurements and data collected through the office of the Sacramento-San Joaquin Water Supervisor in the five-year period, 1924 to 1928, inclusive. These data have been reported annually in mimeograph form* but to insure preservation and permanence as well as to afford an opportunity for review, comparisons, summarizations and such analyses as may be made, they are now brought together in this bulletin.

Origin and History of Work.

The water situation on the Sacramento and lower San Joaquin rivers and in the Sacramento-San Joaquin delta is one that has become well known throughout the state, and published Bulletins No. 3 and No. 4 of the division have described in detail the particular conditions and events in 1924 which lead to the inception of the Sacramento-San Joaquin Water Supervisor work in that year. Bulletin No. 3 is a record of the proceedings of the first Sacramento-San Joaquin River Problems Conference held in January, 1924, and Bulletin No. 4 reports the transactions and papers of the second conference which met in December, 1924, and presents the Water Supervisor's report for the 1924 season. The first conference resulted in the appointment of a committee known as "The Permanent Committee of the Sacramento-San Joaquin River Problems Conference," and through the efforts of this committee working with the Division of Water Rights,** the office of Water Supervisor was established by that division, "to bring about the greatest possible conservation of water and to commence the collection of the records of use of water, stream flow and other engineering data necessary in the ultimate attainment of a solution to the water problems." The necessary funds for the conduct of the work in 1924 were raised, through the efforts of the permanent committee, almost entirely by voluntary local subscription. Since 1924, however, the work has been carried on under state appropriation and is costing approximately $23,000 per year.

The Situation.

In the Sacramento-San Joaquin territory from Redding at the upper end of the valley on the north to Vernalis and lower San Joaquin River points on the south the present water requirements may be grouped as follows:

(1) Irrigation.—Above the city of Sacramento, for approximately 90,000 acres of rice and 80,000 acres of general crops on the Sacramento River itself and 50,000 acres of rice and 40,000 acres of general crops on its tributaries. Below Sacramento, in the 425,000-acre delta region, for an area of nearly 300,000 acres of general crops irrigated annually, and on the uplands bordering the delta for about 55,000 acres of general crops.

(2) Navigation.—Requires sufficient flow in the Sacramento River for 125 miles above Sacramento to permit the passage of freight steam-

* Except records for 1924 which were published as a part of Bulletin No. 4.

** Under a reorganization effective August, 1929, the Division of Water Rights as a division was abolished and became a part of the Division of Water Resources. This bulletin covers a period of activity prior to the reorganization, and references herein to the Division of Water Rights apply to the present Division of Water Resources.

ers. The federal government has stated that a flow of about 3500 second-feet is needed to properly care for this requirement.

(3) Salinity Control.—Requires a flow to the Delta sufficient to protect that area from the encroachment of salt water from San Francisco Bay. The investigations to date indicate that to accomplish this there must be a combined flow of the Sacramento and San Joaquin rivers to the delta of not less than about 4000 second-feet.

With an almost unbroken succession of years of subnormal stream flow since 1916, the full satisfaction of these water requirements has been impossible and in 1920, 1924 and 1926, but particularly in 1924, the situation was acute. This will be the more vividly apparent by reference to Table 1, which indicates for the years 1924 to 1928, inclusive, the amount of stream flow at Red Bluff, the irrigation draft Redding to Sacramento, and the segregation of the draft under the various rights claimed. Compare, in turn, these data with the facts that the ultimate use, Sacramento to Redding, of appropriative rights under permits already granted by the Division of Water Rights, will probably amount to 4000 second-feet and that there is a total maximum use to date of 2000 second-feet under old appropriative and riparian claims on the same stretch of river.

TABLE 1

SACRAMENTO RIVER-STREAM FLOW, IRRIGATION DRAFT AND WATER RIGHTS, 1924-1928

Year	Discharge of Sacramento River at Red Bluff (second-feet)		Irrigation draft Sacramento to Redding average July to September, inclusive (second feet)	Segregation of July draft to water right classifications (second-feet)			
	Average July to September, inclusive	July		*Old appropriative rights	**Appropriative rights under W. C. Act	***Presumably Riparian or unknown old appropriative rights	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1924	2,920	2,900	2,470	895	1,620	565	3,080
1925	3,640	3,650	2,970	962	2,290	188	3,440
1926	3,140	3,190	3,210	1,208	2,690	322	4,220
1927	4,010	4,480	3,510	1,145	2,604	471	4,220
1928	3,730	4,040	2,925	1,006	2,480	206	3,692

* Initiated prior to the Water Commission Act.
** In this segregation were included only the appropriative rights which have no riparian claims.
*** Includes appropriative rights which also have riparian claims.

Alleviating Factors.

Fortunately, for the present, use through appropriative rights initiated under the Water Commission Act has not, as shown by the figures of column 6, Table 1, reached full development, and fortunately also, due to rotation and idle lands, full use under all riparian and old appropriative rights does not occur simultaneously, as indicated in columns 5 and 7 of Table 1. Another and most important factor in alleviating the shortage of water for navigation and for the delta is the return water; the water which has been diverted in excess of the actual requirements of the crops, and which, returning to the river, is again available for use. The extent and importance of this return is brought out in a chapter of this bulletin devoted to that subject.

Water Supervisor Function.

The ultimate relief for the conditions as described lies, of course, in conservation by storage and the successive development as demanded of projects such as have been proposed for the Sacramento and San Joaquin drainage areas in the State Engineer's report on "The Water Resources of California and a Coordinated Plan for their Development."* Prior to these developments, however, there is much that can and must be done in the way of conservation of the existing water supply and determination of water rights, or at least determination of the extent of water uses under the various water rights claimed, thereby furnishing a basis for an adjudication or mutual agreement as to the rights, under which an administrative schedule for distribution of the water can be operated. In a word, then, the function of the Water Supervisor's office has been and is to accomplish these ends.

Scope of Work.

The work of the Water Supervisor is broadly divided between two fields: (1) the engineering investigation, measurements, collection of records and data, etc., and (2) the conservation efforts, waste prevention, and such administration of the stream flow, as shall fall within the jurisdiction of the Division of Water Rights or be mutually agreed upon by the water users.

The Engineering Investigation.

This has comprised measurements and records of all diversions of water from the Sacramento, Feather, Yuba, American and lower San Joaquin rivers within the valley floor and above the delta; stream flow measurements throughout the territory, largely in cooperation with the Water Resources Branch, U. S. Geological Survey; measurements and records of waters returned to the Sacramento and San Joaquin rivers; studies of the duty of water on peat and sedimentary lands in the delta region in cooperation with the U. S. Department of Agriculture, Division of Agricultural Engineering, and the University of California Agricultural Experiment Station; an annual census of irrigated areas and crops under all diversions recorded and throughout the delta; and investigation and study of the advance and retreat of salinity in the delta channels and upper bays.

Organization.

This has included the Water Supervisor, two assistant hydraulic engineers working on the Sacramento River and one assistant hydraulic engineer covering the Feather, Yuba and American rivers, the delta uplands and the irrigation census in the delta. The organization for the cooperative delta duty of water investigations under the direction of W. W. McLaughlin, Associate Chief, Division of Agricultural Engineering, U. S. Department of Agriculture, has included an hydraulic engineer and one or two assistants giving full time to the field work.

Above Sacramento the division from Sacramento to Meridian has been in charge of engineer Martin H. Blote since the beginning of the work in 1924. On the division from Meridian to Redding the engineers in charge have been, D. S. Hays 1924 and 1926, E. W. Case 1925, and James M. Brockway 1927 and 1928. The census of irrigated crops in

* See Bulletin No. 12, Division of Engineering and Irrigation, Department of Public Works.

the delta region, the work in the delta uplands and that on the Feather, Yuba and American rivers, has been in charge of engineers Spencer M. Munson 1924, 1926 and 1927, D. S. Hays 1925, and Biscoe Kibbey 1928. In 1924, 1925 and 1926, the return water measurements in the San Joaquin Valley were made by T. R. Simpson and Irving M. Ingerson, engineers in the regular organization of the Division of Water Rights. In 1927 and 1928 these measurements have been made by the engineers in the Water Supervisor's organization. Major O. V. P. Stout has been in charge of the delta cooperative work, with engineer Lloyd N. Brown in resident charge at King Island, 1924 to 1928, and engineer Frank Davis at Reclamation District 999, 1925 to 1927. Engineer A. M. Wells was in resident charge at Reclamation District 999 in 1924, and A. A. Young was on some part-time work in connection with the delta investigation in 1928.

Conservation Features.

In connection with this phase of the Water Supervisor's work, the greater or lesser requirement for conservation measures in the seasons of 1924 to 1928, inclusive, is indicated in the data of Table 2, which gives the run-off and minimum stream flow figures for those years.

TABLE 2

RUN-OFF AND MINIMUM FLOW 1924-1928

Year	Entire run-off to San Francisco Bay in per cent of normal*	Minimum flow in second-feet		
		Sacramento River		San Joaquin River near Vernalis
		At Colusa	At Sacramento	
1924	27	1,470	705	391
1925	78	1,870	2,760	660
1926	55	1,030	1,330	565
1927	108	1,960	3,420	1,290
1928	75	1,960	2,510	840

* As measured at the foothill stations of all main tributaries.

The most critical season was that of 1924, the driest year of record, and it was the impending crisis, evident as early as January of that year, which set in motion the steps to effect the necessary conservation through the River Problems Conference, its permanent committee and the Water Supervisor. Through the medium of a water users agreement the signers pledged themselves to exercise their respective rights to use of water in such a manner as to accomplish the maximum degree of water conservation and to at all times refrain from acting in any way to hinder or prevent the Water Supervisor in the execution of his work. On all of the larger projects, conservation officers were appointed to work with the supervisor in the detection and prevention of waste and valuable assistance was rendered in this connection. A report of the work in 1924 and the success attendant upon the measures effected in that season has been published in detail in Bulletin No. 4 and needs no elaboration here. Suffice it to say that when the most critical time came about the middle of July, and it seemed that portions of the delta area faced disaster due to the salinity encroachment, the appeal to up-river water users for further diversion reductions and the effective

operation of the waste prevention and curtailment program proved successful, beyond all expectation, in meeting the situation.

In the 1925, 1927 and 1928 seasons the necessity for strenuous conservation measures was considerably lessened and the work in these seasons, therefore, was confined largely to the engineering investigation. There were, however, certain conservation efforts and actions demanded to greater or lesser extent in connection with such features as navigation and the gun clubs, in every year.

In 1926, as shown in Table 2, the seasonal run-off to San Francisco Bay was only 55 per cent of normal and although conditions were not as serious as in 1924 a considerable effort was required to effect the greatest water savings and relief for the up-river navigation and delta irrigation and salinity difficulties. The procedure was similar to that of 1924 and again the work was carried on almost entirely through appeals to the water users for waste prevention and reduction of diversions where possible. It is to be noted that in both 1924 and 1926 the conservation measures effected were purely voluntary and there was no enforcement of any particular schedule of water diversions agreed upon by the water users.

Navigation.

The authority of the federal government in the interest of navigation is well known. Every permit issued by the Division of Water Rights for diversion of water from the Sacramento River contains the following clause: "As the right of the United States to control streams in the interests of navigation is paramount, this permit will in no way hinder the United States if it desires to stop this diversion under claim of its interference with nagivation." In the seasons of low stream flow and large irrigation diversions there has been, therefore, a serious problem with respect to navigation on the Sacramento River above the city of Sacramento. In 1924 the river flow diminished so rapidly that as early as the latter part of June there was insufficient flow to maintain navigation and from that time until September it was practically abandoned. In that season, however, the U. S. War Department officers, charged with the maintenance of navigation, adopted a lenient attitude and, in view of the demonstration by the water users through the River Problems Conference, its permanent committee and the Water Supervisor that every effort was being made to make the best of the situation, made no move to arbitrarily enforce the rights of the federal government by enjoining diversions. In speaking of this situation in an address before the Second Sacramento-San Joaquin River Problems Conference, Colonel U. S. Grant III, then district engineer for the War Department, stated:

> * * * The irrigationists should appreciate the obligation which rests upon the War Department to prevent diversions which destroy the navigability of the Sacramento River. The War Department has withheld action in this matter because of its desire not to increase unnecessarily the difficulties of the situation, recommendations having even been made by one of my predecessors for legislation which would temporarily legalize this attitude. However, lacking such legislation and with the apparently irresponsible and unlimited diversions which have been initiated in the past five years, then it may prove impossible to postpone action by the department for any extended period.
>
> To justify the department in postponing action, which might be very harmful to some agricultural interests in the valley it seems necessary that the most economical use of the available water should be assured and that a plan for

> reconciling conflicting interests and adjusting their requirements to the best needs of the community should be manifestly in course of preparation. To a great extent this assurance seems to have been given by the water problems conference and its permanent committee. The appointment of a water master and the results obtained during the past summer are the best evidence of the good faith and determination to bring about the required solution of this intricate problem. Such control and economy in the use of water should be continued until a satisfactory plan has been adopted, and the initial steps for its execution have been taken.

In 1925, although there was no serious shortage of water for irrigation purposes, the flow of the Sacramento River between Colusa and Butte City and in the vicinity of Verona fell, in August, to a point where navigation was nearly prohibited. In response, therefore, to a letter from the War Department, asking that further measures be taken to increase the flow for navigation, letters signed by the permanent committee were sent to approximately 150 irrigationists north of Sacramento. These letters appealing for conservation and all possible cutting down of diversions were followed by personal contacts through the Water Supervisor's organization. It was found that there was some resulting improvement in the river flow but not in the amount required. On the other hand, without the efforts made just at this time, a considerable reduction in flow might have occurred such as to entirely impair navigation.

In the latter part of June, 1926, with the flow of the river dropping quite rapidly and down close to previous low water levels, difficulty with navigation began to be encountered and, as in 1925, letters were again received from Major C. S. Ridley, district engineer for the War Department, requesting that measures be taken in an endeavor to insure additional water for the maintenance of navigation. In response, the Water Supervisor interviewed the representatives of all of the larger water users, requesting all possible reductions in diversions and advising that it would be required that waste and seepage be reduced to a minimum. This was followed by letters to all water users making any appreciable diversion. Feather River water users were included in this appeal. A number of instances were found where waste could be prevented and in almost every case the water users appeared to be making a sincere effort to reduce their diversions to the minimum amount necessary to mature their crops. Letters from many of the larger users outlining the conservation measures taken were received and copies of these letters were forwarded to Major Ridley. In spite of the cooperation given, however, it was not possible to obtain sufficient flow to maintain navigation to or above Colusa until early in September. *It would appear, therefore, that the limit of benefit to be derived through waste prevention and voluntary diversion reductions was reached and that in such seasons as that of 1926 additional water can only be obtained by more drastic measures necessitating the elimination of some of the areas watered.*

Even in 1927, a year of 108 per cent run-off as shown by Table 2, there occurred some difficulty with respect to navigation in the vicinity of Colusa. The situation was at no time as serious as that of 1926 but certain measures on the part of the Water Supervisor similar to those of that year, although not so extended, were required.

Gun Clubs.

The use of water by gun clubs for duck ponds has proven to be a matter of considerable importance in the conservation work. During the critical time in 1924 it was discovered that some of the clubs had commenced to divert water for filling their duck ponds and this led to an investigation and realization of the extent of duck club activities. The majority of the Sacramento Valley clubs are located in Glenn, Colusa and Butte counties on both sides of the Sacramento River and Butte Creek. The particular "centers" are situated in the "trough" area west of Colusa and in Butte Basin between the Sacramento River and the Marysville Buttes. In this territory the clubs own or control somewhere in the neighborhood of 35,000 acres and flood as high as 20,000 to 25,000 acres for duck ponds. Many of the clubs have spent large sums in acquiring land and water, building the club houses and developing the preserves.

With the up-river irrigators exerting every effort to conserve water so that every drop available from every source, including all drainage water, might flow down to assist the delta condition, it was clearly not equitable that diversions for duck clubs be permitted. Only a few of the Sacramento Valley clubs receive their water by direct diversion from the river and most of them fill their ponds from drainage channels. However, if this drainage water were not diverted it would return to the Sacramento River. On the West Side the chief source is the "trough" of Colusa Basin which is tributary to the river at Knights Landing. On the East Side the source is chiefly drainage from the large areas irrigated by the Western and Sutter-Butte canals which divert from the Feather River. This drainage comes down Butte Creek and large drains of various reclamation and drainage districts, and if not diverted would join the Sacramento River five and one-half miles below Colusa.

In 1924 it was felt that the clubs that had commenced diversions were not cognizant of the critical water situation and had no intention of taking water to the detriment of irrigation. This proved to be the case, for after a letter of explanation had been sent to the clubs by the River Problems Committee it was found in nearly every instance that compliance was made to the Water Supervisor's request for discontinuance of diversions. In taking only drainage water many of the clubs had thought there could be no interference with irrigation. However, the demonstration of the value to irrigation of the return to the river of this drainage water corrected this situation.

The duck shooting season does not open until October first but many clubs claim that by beginning diversions as early as August, conditions for shooting by the time of the opening are much better than with diversions commencing later. In 1924 the clubs were asked to defer diversions until September 15th.

In 1925 the clubs were again asked to defer diversions chiefly because of the shortage of water for navigation. Although the response in this instance was good, there seemed to be an inclination to give less consideration to requested measures based upon navigation requirements rather than those of irrigation. At a meeting of the River Problems Committee on September 25, 1925, representatives of the War Department and gun clubs were present and the situation respecting the use

of water by the clubs was discussed. The club representatives expressed a desire to cooperate with the committee and it was agreed that a solution to the major portion of the difficulties could probably be attained by effecting a change in the opening date for duck shooting season from October 1st to October 15th. This would permit of later diversions which would not conflict with irrigation or navigation and still allow the clubs sufficient time to fill the ponds before the opening of the duck shooting season. Following up this idea, during the winter of 1925–26 a petition was forwarded by the River Problems Committee to the U. S. Secretary of Agriculture asking that the duck shooting season for California be changed to the period October 15th–February 1st. The necessity for this change as a conservation measure was outlined to the Secretary and supporting papers showing a favorable attitude to the change on the part of sportsmen and the California Fish and Game Commission were enclosed. In response to this petition, word was received from Washington on June 24, 1926, that the open season on water fowl in California had been changed to the period October 15th–January 31st. Under this change the season was opened on October 15th in the fall of 1926 and the following January, within the first few days of the 1927 legislative session, an emergency measure was passed, making the California law conform to the new federal regulation, thereby insuring to the sportsmen the additional fifteen days from January 15 to 31, 1927.

In 1926 it was necessary to require that the gun clubs defer diversions to assist both the irrigation and navigation situation. Although the change in duck shooting season operated automatically to help the situation, there were some instances of early diversions. The few clubs taking water were again notified that diversions should be withheld and on August 5, 1926, these notices were further supported by a letter from the River Problems Committee to the effect that continued diversions would make it necessary that legal steps be taken to enjoin the use of water. Such action did not become necessary and on the whole, the cooperation extended by nearly all of the clubs and the sincere desire upon their part to help the situation were most commendable. When, early in September, the flow of the Sacramento River at Sacramento increased to over 3000 second-feet, those gun clubs whose use of water would not affect the water stages in the vicinity of Colusa were notified that diversions could be commenced, and later, by September 10th, this notice was extended to all clubs.

In 1927 the requirements for withholding diversions were confined to the gun clubs diverting water directly from the Sacramento River above Colusa.

With the duck shooting season October 15th–January 31st in effect in 1926, sportsmen reported many complaints from the areas in the higher altitudes of the eastern and northern parts of the state because of the fact that in October the waters freeze over and with the changed season the period available for duck shooting was very limited. Some objection was made also to a season ending as late as February 1st because it was claimed this extended it into the mating season. In an endeavor to reconcile the various differences, an effort was made by sportsmen's organizations, through the 1927 legislature and the Biological Division of the U. S. Department of Agriculture, to establish

the area east of the summit of the Sierra Nevada mountains and north of Mt. Shasta region, as a district by itself, with the season October 1st to January 15th. The Biological Division, however, would not consent to such a division of the state and finally, in the last days of the 1927 legislative session, the season for all of California was changed back to the original dates, October 1st–January 15th, by order of the U. S. Department of Agriculture and conforming act of the state legislature. With the change to the original dates, assurance has been given by the duck clubs that the earlier opening of the season will not be permitted to result in earlier diversions of water when these might interfere with irrigation or navigation.

It will be seen that the importance of the gun clubs in the water situation is somewhat more than a casual consideration would indicate. The principle of priority to irrigation and navigation in times of water shortage has been recognized by the clubs and a willingness on their part to work with the Division of Water Rights and the River Problems Committee in these matters has been clearly evidenced. Recognizing the position of the clubs, invitation was extended to them by the River Problems Committee to appoint a representative to hold membership on the committee. Through the United Gun Clubs, an organization formed in 1925 which has greatly facilitated contact with the clubs, Manly S. Harris of San Francisco was appointed to this membership.

The position of the Division of Water Rights with respect to granting permits for the use of water for duck club purposes was established in June, 1927. Prior to this time permits upon applications of this character were withheld pending an investigation of the use of water by duck clubs and the relation of such diversions to domestic, irrigation, navigation, power and other uses of water. The decision reached in 1927 under which permits for duck club purposes are now issued holds, in effect, that whereas the use of water for filling duck ponds can not be considered a non-beneficial use, it would appear to properly take an inferior position with respect to diversions for domestic, irrigation, navigation and other essential uses. In line with the decision, permits now issued by the Division of Water Rights for duck purposes contain the following limiting clauses:

1. No right to water shall be acquired for the purpose authorized under this permit which shall authorize use to the disadvantage of any right which may subsequently be acquired for use for domestic, irrigation, agricultural, municipal, power, industrial, mining, or any other more beneficial purpose.

2. This permit is issued subject to the express condition that diversions to use for the purpose hereunder authorized may be regulated or stopped by the Division of Water Rights as by it deemed necessary to prevent interference with rights heretofore or hereafter acquired under applications for more beneficial purposes.

The Permanent Committee.

Emphasis should be given to the great value in the conservation work and in the entire investigation, of the Permanent Committee of the Sacramento-San Joaquin River Problems Conference. Since the first conference this committee has functioned actively and has proven to be a powerful influence in welding together the divergent interests

involved, in bringing about constructive cooperative effort and in preventing litigation in the face of critical situations that have arisen. In this committee and the River Problems Conference there has been created a most fortunate medium for dealing with the problems involved; and at present, the committee, both as representing the water users and as consultant to the division, stands as the proper body to forward an administrative schedule for water distribution or any constructive plans of this nature for bettering the situation.

Water Users Organizations.

In a territory as large as that of the Sacramento-San Joaquin, difficulty is encountered in making contact and dealing with such a large number of individual water users. However, in any program for conservation or in the development of a schedule for water allocation based upon mutual agreement, all should of course be included. The solution of this difficulty would appear to be the formation of local water users associations, combining in each association those water users in a particular locality where there are local problems of common interest or where there is some particular situation which sets that locality apart from others. The Division of Water Rights, Water Supervisor and permanent committee, could then deal with these associations, thus reaching through them, with facility and dispatch, all of the water users. A promising step in this direction, resultant from the 1926 shortage for irrigation, was the action taken by districts and water companies on the Sacramento River in organizing the Knights Landing North Water Users Association. This association, as the name implies, includes all Sacramento River water users north of Knights Landing. As stated in its constitution the purpose is to form an organization

> * * * to the end that the low water flow of the river may be so used and conserved as to avoid friction and litigation among diverters * * * and to work with the United States War Department in charge of navigation on the Sacramento River, the State Division of Water Rights, and the permanent committee of the Sacramento-San Joaquin River Problems Conference in all questions of policy regarding the use of water from the river.

This organization can greatly facilitate conservation work and all dealings with the water users within it, and the possibility and advantage of either the formation of similar associations or the reorganization of existing ones so that the entire Sacramento-San Joaquin territory would be covered, is worthy of consideration.

CHAPTER II

MEASUREMENTS OF STREAM FLOW

During the irrigation seasons 1924 to 1928, inclusive, stream flow measurements in the Sacramento-San Joaquin territory have been obtained through the cooperation of the Water Resources Branch of the U. S. Geological Survey for stations as follows:

Sacramento River at Red Bluff, Butte City, Colusa and Knights Landing, 1924–1928, inclusive.

Sacramento River at Kennett and Verona, 1926–1928, inclusive.

Feather River at Nicolaus, 1924–1928, inclusive.

American River at Fairoaks, 1924–1928, inclusive.

Mokelumne River at Woodbridge, 1924–1928, inclusive.

Mokelumne River at Thornton, 1926–1928, inclusive.

San Joaquin River near Vernalis, 1924–1928, inclusive.

Supplementing these the Water Supervisor has maintained additional stations on Upper Butte Creek one mile west of the East Side Highway, 1925–1928, inclusive; on lower Butte Creek and Butte Slough, 1924–1928, inclusive; on the American River at H street bridge, Sacramento, 1924–1928, inclusive; and, in connection with return water measurements, at a considerable number of other stations as reported in Chapter IV.

The stations at Kennett, Red Bluff and Woodbridge are maintained throughout the year, but the records are given in this report for the irrigation season only.

Because there is tidal action at Sacramento during the irrigation season, it has not been possible to maintain a gaging station at this point. The record given for the daily discharge at Sacramento is therefore one which has been computed by using the Knights Landing record (1924 and 1925) and Verona record (1926–1928, inclusive) and making due allowance for the inflow and draft between these stations and Sacramento.

TABLE 3

COMPARATIVE STREAM FLOW DATA

Year	Seasonal run-off to San Francisco Bay in per cent of normal	Average discharge in second-feet during minimum month (July or August)						
		Sacramento River				Feather River at Nicolaus	American River at "H" Street bridge Sacramento	San Joaquin River near Vernalis
		Red Bluff	Knights Landing	Verona	Sacramento			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1924	27	2,900	1,090	----------	909	10	16	420
1925	78	3,490	2,140	----------	3,030	543	335	820
1926	55	3,090	1,390	1,990	1,880	396	190	601
1927	108	3,770	2,340	3,520	3,660	709	388	1,400
1928	75	3,580	2,050	2,940	2,880	500	236	919

In Table 3 the variation in stream flow at the various stations, 1924 to 1928, inclusive, is well indicated in the comparison between the minimum monthly discharges and the seasonal run-off to San Francisco

Bay in per cent of normal. The latter figure as used represents the flow of all major streams tributary to San Francisco Bay as measured at the foothill stations of the U. S. Geological Survey. For the irrigation season, therefore, it does not take account of the draft below the measuring stations. It will be noted that the seasonal variation in run-off is closely reflected by the minimum at these stations, although the degree of reflection is comparatively small at the Red Bluff station.

This chapter presents the daily discharge records, 1924 to 1928, inclusive, for the various stations, and certain other miscellaneous measurements of stream flow which were made.

TABLE 4

DISCHARGE OF SACRAMENTO RIVER AT KENNETT—1926

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	5,150	5,850	3,360	2,920	2,780	2,730	2,820
2	5,150	5,670	3,480	3,020	2,730	2,780	2,920
3	4,980	5,320	3,480	3,020	2,690	2,780	2,920
4	5,490	5,150	3,480	3,020	2,730	2 730	2,920
5	6,030	5,490	3,480	2,920	2,780	2,730	2,920
6	6,400	5.150	3,480	2,920	2,730	2,730	2,920
7	10,500	5,150	3,240	2,920	2,780	2,690	2,870
8	28,400	5,150	3,240	2,920	2,730	2,690	2,870
9	20,700	4,980	3,130	2,920	2,690	2,730	3,130
10	14,500	4,810	3,360	2,920	2,690	2,730	4,980
11	12,700	4,650	3,360	2,920	2,650	2,780	3,890
12	11,000	4,490	3,240	2,920	2,650	2 730	3,360
13	9,820	4,330	3,360	2,920	2,690	2,730	3,240
14	9,170	4,180	3,130	2,870	2,780	2,730	3,130
15	8,550	4,030	3,130	2,920	2,730	2,730	3,130
16	8,350	4,030	3,130	2,870	2,730	2,690	3,130
17	8,150	3,890	3,130	2,870	2,780	2,690	3,240
18	7,950	3,890	3,240	2,870	2,780	2,690	3,130
19	7,350	3,890	3,130	2,870	2,780	2,730	3,160
20	6,970	3,750	3,020	2,820	2,730	2,690	3,160
21	6,780	3,750	3,130	2,730	2,780	2,730	3,080
22	6,590	3,750	3,240	2,820	2,650	2,730	3,130
23	6,400	3,890	3,130	2,820	2,690	2,780	3,130
24	6,400	3,890	3,020	2,820	2,690	2,780	3,130
25	6,210	3,610	3,020	2,820	2,690	2,730	3,130
26	6,210	3,750	3,020	2,780	2,730	2,780	3,130
27	6,210	3,750	3,020	2,780	2,730	2,780	3,130
28	6,030	3,890	3,020	2,780	2,730	2,780	3,130
29	5,850	3,750	3,130	2,870	2,690	2,780	3,130
30	5,850	3,750	3,020	2,820	2,730	2,780	3,130
31	----------	3,610	----------	2,820	2,730	----------	3,130
Mean	8,660	4,360	3,210	2,880	2,720	2,740	3,170
Acre-feet for month	515,000	268,000	191,000	177,000	167,000	163,000	195,000

NOTE—This is a permanent station of the Water Resources Branch of the U. S. Geological Survey established at Kennett in 1925. This station is maintained throughout the year, but the record is given here for the period of the irrigation season only.

TABLE 5

DISCHARGE OF SACRAMENTO RIVER AT KENNETT—1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	25,900	11,500	6,590	4,490	3,480	3,480	3,360
2	53,600	11,000	6,590	4,330	3,610	3,610	3,240
3	48,300	10,500	6,590	4,330	3,480	3,480	3,240
4	30,600	10,300	6,590	4,330	3,360	3,360	3,130
5	24,400	10,000	6,780	4,330	3,360	3,360	3,240
6	20,700	11,000	6,780	4,330	3,480	3,360	3,240
7	18,500	10,500	6,590	4,330	3,360	3,360	3,240
8	16,800	9,820	7,160	4,330	3,360	3,360	3,240
9	15,600	9,380	7,160	4,180	3,480	3,360	3,130
10	14,800	9,380	6,590	4,030	3,480	3,360	3,240
11	15,100	9,170	6,590	4,180	3,360	3,360	3,240
12	14,300	9,170	6,590	4,030	3,360	3,360	3,240
13	13,500	9,380	6,030	4,030	3,360	3,360	3,240
14	13,200	9,820	6,030	4,030	3,360	3,360	3,240
15	12,700	10,000	6,030	4,030	3,360	3,480	3,130
16	12,500	10,000	5,850	3,890	3,240	3,360	3,130
17	11,700	9,820	5,670	3,890	3,240	3,360	3,130
18	11,700	9,170	5,490	3,610	3,240	3,360	3,130
19	11,200	8,550	5,150	3,750	3,240	3,240	3,240
20	10,800	8,150	4,810	3,750	3,240	3,240	3,240
21	10,300	7,750	4,810	3,750	3,240	3,360	3,130
22	10,800	7,550	4,810	3,750	3,240	3,240	3,130
23	10,000	7,350	4,980	3,890	3,240	3,360	3,130
24	10,800	7,350	5,150	3,610	3,240	3,240	3,240
25	12,000	7,350	4,810	3,360	3,360	3,360	3,240
26	13,200	7,350	4,490	3,610	3,360	3,130	3,480
27	13,500	7,350	4,810	3,610	3,360	3,240	3,750
28	12,700	7,350	4,810	3,610	3,360	3,360	3,480
29	12,200	6,970	4,650	3,610	3,360	3,360	3,480
30	12,000	6,590	4,810	3,750	3,360	3,240	3,480
31	----------	6,400	----------	3,750	3,360	----------	3,610
Mean	17,100	8,900	5,790	3,950	3,350	3,350	3,270
Acre-feet for month	1,020,000	547,000	345,000	243,000	206,000	199,000	201,000

TABLE 6

DISCHARGE OF SACRAMENTO RIVER AT KENNETT—1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	22,600	8,360	4,590	3,710	3,330	3,210	3,210
2	25,100	8,160	4,750	3,850	3,330	3,210	3,210
3	21,000	7,960	4,590	3,850	3,210	3,100	3,210
4	18,600	7,560	4,430	3,850	3,210	3,100	3,330
5	17,500	7,560	4,430	3,710	3,210	3,100	3,450
6	17,200	7,560	4,430	3,710	3,210	3,100	3,330
7	15,900	7,160	4,280	3,710	3,210	3,100	3,330
8	15,100	7,760	4,280	3,710	3,100	3,100	3,210
9	14,600	7,560	4,130	3,710	3,210	3,100	3,210
10	13,800	7,560	4,280	3,710	3,100	3,100	3,210
11	12,800	7,560	4,430	3,710	3,100	3,210	3,210
12	12,300	7,160	4,430	3,580	3,100	3,210	3,100
13	11,500	6,560	4,280	3,580	3,100	3,210	3,210
14	10,800	6,180	4,130	3,580	3,210	3,210	3,210
15	10,600	6,180	4,130	3,450	3,210	3,210	3,210
16	12,300	5,990	4,130	3,450	3,210	3,210	3,210
17	13,000	5,990	4,130	3,450	3,210	3,100	3,210
18	12,000	5,800	3,990	3,450	3,100	3,100	3,210
19	11,500	5,620	3,990	3,450	3,100	3,210	3,210
20	10,800	5,620	3,990	3,580	3,100	3,210	3,210
21	10,300	5,620	4,130	3,580	3,100	3,210	3,210
22	9,880	5,990	3,990	3,580	3,100	3,210	3,210
23	9,660	5,620	3,990	3,580	3,100	3,100	3,210
24	10,100	5,440	3,990	3,580	3,210	3,100	3,210
25	9,660	5,260	3,990	3,580	3,210	3,210	3,210
26	9,220	5,090	3,850	3,450	3,210	3,210	3,210
27	9,000	5,090	3,850	3,450	3,210	3,210	3,210
28	9,000	5,090	3,850	3,450	3,210	3,210	3,210
29	8,560	4,920	3,850	3,330	3,210	3,210	3,210
30	8,360	4,750	3,850	3,330	3,210	3,210	3,330
31	----------	4,590	----------	3,330	3,210	----------	3,330
Mean	13,100	6,370	4,170	3,580	3,180	3,170	3,230
Acre-feet for month	780,000	392,000	248,000	220,000	196,000	189,000	199,000

TABLE 7

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF—1924

Day	Daily discharge in second-feet							
	March	April	May	June	July	August	September	October
1	4,790	4,300	3,490	3,060	2,980	2,900	2,900	2,900
2	4,790	4,300	3,490	3,060	2,980	2,900	2,900	2,900
3	4,900	4,200	3,490	3,060	2,900	2,900	2,900	2,980
4	4,900	4,590	3,400	2,980	2,900	2,900	2,900	3,060
5	4,790	4,490	3,400	2,980	2,900	2,810	2,900	3,060
6	4,690	4,390	3,320	2,980	2,810	2,810	2,900	3,240
7	4,590	4,390	3,400	2,900	2,900	2,810	2,900	3,240
8	4,590	4,390	3,320	2,980	2,980	2,810	2,900	3,320
9	4,590	4,390	3,240	2,980	2,980	2,900	2,900	3,320
10	4,590	4,200	3,240	3,060	2,900	2,900	2,900	3,320
11	4,490	4,010	3,320	2,980	2,900	2,810	2,900	3,320
12	4,490	4,010	3,320	2,980	2,900	2,810	2,900	3,320
13	4,390	4,010	3,320	2,980	2,900	2,810	2,900	3,320
14	4,390	3,920	3,400	2,980	2,980	2,900	2,900	3,320
15	4,300	4,010	3,400	2,980	2,900	2,900	2,980	3,400
16	4,300	4,010	3,320	2,980	2,900	2,900	2,980	4,390
17	4,300	3,920	3,240	2,980	2,810	2,900	2,980	4,010
18	4,100	4,100	3,240	2,900	2,810	2,900	2,980	3,740
19	4,100	4,010	3,240	2,980	2,900	2,980	2,980	3,580
20	4,010	3,740	3,150	2,900	2,900	3,060	2,900	3,580
21	4,010	3,740	3,150	2,900	2,900	3,060	2,900	3,580
22	4,100	3,920	3,150	2,900	2,900	3,060	2,980	3,580
23	4,100	3,830	3,150	2,980	2,900	3,060	3,060	3,580
24	4,300	3,920	3,060	2,980	2,900	2,980	3,060	3,660
25	4,490	3,660	3,060	2,980	2,900	2,900	3,060	3,580
26	4,390	3,580	3,060	2,900	2,900	2,900	2,980	3,490
27	4,390	3,580	3,060	2,980	2,900	2,900	2,980	4,010
28	4,390	3,660	3,060	2,980	2,810	2,980	3,060	6,630
29	4,490	3,580	3,150	2,900	2,810	2,900	3,150	10,200
30	4,390	3,580	3,150	2,900	2,810	2,810	3,060	5,430
31	4,300	----------	3,060	----------	2,900	2,900	----------	5,430
Mean	4,430	4,010	3,250	2,970	2,900	2,900	2,960	3,890
Acre-feet for month	272,000	239,000	200,000	177,000	178,000	178,000	176,000	239,000

NOTE—This is a permanent station of the Water Resources Branch of the U. S. Geological Survey, located near the site of the proposed Iron Canyon dam; mile 198.6 above Sacramento. This station is maintained throughout the year but the record is given here for the period of the irrigation season only.

TABLE 8

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF—1925

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	19,800	13,700	8,000	4,100	3,580	3,400	3,830
2	15,900	12,900	9,220	3,830	3,400	3,400	3,920
3	19,800	12,600	10,500	3,830	3,320	3,400	4,010
4	40,000	12,200	9,220	3,740	3,240	3,400	3,830
5	29,000	12,200	8,300	3,530	3,240	3,490	3,630
6	23,600	11,900	8,000	3,400	3,240	3,490	4,010
7	21,000	11,500	7,430	3,400	3,400	3,660	4,300
8	19,400	10,900	7,160	3,320	3,490	4,200	4,100
9	18,200	10,200	7,160	3,240	3,580	3,920	4,100
10	17,400	9,860	6,890	3,060	3,580	3,740	4,010
11	20,200	9,540	6,630	2,900	3,660	3,660	4,010
12	30,300	10,200	6,370	3,580	3,660	3,660	4,010
13	24,000	12,900	6,370	3,830	3,660	3,580	4,100
14	21,000	12,600	6,120	3,920	3,660	3,580	4,100
15	19,800	11,200	5,830	3,920	3,660	3,490	4,100
16	20,200	10,500	5,880	3,740	3,580	3,580	4,100
17	20,600	10,500	5,650	3,740	3,580	3,830	4,200
18	19,000	10,200	5,650	3,580	3,580	4,900	4,100
19	26,700	9,860	5,320	3,660	3,580	4,390	4,010
20	22,900	9,860	4,790	3,660	3,490	4,300	4,010
21	25,800	10,500	4,790	3,920	3,490	4,010	4,100
22	21,400	9,860	4,900	3,830	3,490	3,920	4,010
23	19,800	9,220	5,000	3,830	3,490	3,830	4,010
24	18,600	8,910	4,690	3,830	3,580	3,660	4,010
25	17,000	8,600	4,590	3,830	3,490	3,660	3,920
26	15,900	8,300	4,490	3,830	3,490	3,660	3,920
27	14,800	8,000	4,300	3,660	3,490	3,660	3,920
28	14,000	7,710	4,100	3,660	3,400	3,740	4,010
29	13,700	7,710	4,200	3,580	3,400	4,010	4,010
30	13,700	7,430	4,300	3,490	3,320	3,920	4,100
31	----------	7,430	----------	3,740	3,400	----------	4,010
Mean	21,000	10,300	6,200	3,650	3,490	3,770	4,020
Acre-feet for month	1,250,000	633,000	369,000	224,000	215,000	224,000	247,000

TABLE 9

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF—1926

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	6,370	7,710	4,440	3,240	3,150	3,060	3,240
2	6,370	7,710	4,370	3,240	3,150	3,150	3,490
3	6,120	7,160	4,300	3,320	3,060	3,150	3,490
4	6,370	7,660	4,200	3,320	3,060	3,150	3,400
5	8,600	8,300	4,100	3,320	3,060	3,060	3,400
6	10,900	8,000	4,100	3,240	3,150	3,060	3,400
7	12,200	8,300	4,010	3,240	3,150	3,150	3,320
8	36,600	8,000	3,920	3,320	3,150	3,060	3,320
9	48,200	7,160	3,920	3,320	3,150	3,060	3,400
10	29,000	6,890	3,830	3,240	3,150	3,150	5,650
11	25,400	6,630	3,920	3,240	3,150	3,150	5,320
12	19,800	6,120	3,830	3,320	3,060	3,150	4,200
13	16,600	6,120	3,740	3,240	3,060	3,150	3,830
14	14,800	5,650	3,740	3,240	3,150	3,150	3,740
15	13,700	5,650	3,660	3,240	3,150	3,060	3,830
16	12,600	5,430	3,580	3,150	3,150	2,980	3,830
17	11,900	5,210	3,660	3,150	3,150	3,060	3,740
18	12,600	5,100	3,660	3,150	3,150	2,980	3,660
19	11,200	5,100	3,660	3,150	3,150	2,980	3,660
20	10,200	4,900	3,490	3,150	3,150	3,060	3,660
21	9,540	4,900	3,490	2,980	3,150	3,060	3,660
22	9,220	4,790	3,580	2,980	3,060	3,060	3,660
23	8,910	4,790	3,740	3,060	3,060	3,060	3,660
24	8,600	5,000	3,580	3,150	3,060	3,060	3,660
25	8,300	4,900	3,490	3,150	3,060	2,980	3,580
26	8,300	4,790	3,400	3,150	3,060	3,060	3,660
27	8,000	4,790	3,400	3,060	3,150	3,150	3,660
28	8,300	4,790	3,400	3,060	3,150	3,150	3,660
29	8,000	4,690	3,400	3,150	3,060	3,150	3,580
30	7,710	4,590	3,320	3,150	3,150	3,150	3,580
31	----------	4,520	----------	3,150	3,150	----------	3,490
Mean	13,500	5,980	3,760	3,190	3,120	3,090	3,730
Acre-feet for month	803,000	368,000	224,000	196,000	192,000	184,000	229,000

TABLE 10

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF—1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	24,500	15,500	8,000	5,210	4,100	3,740	3,830
2	71,200	15,500	7,850	5,100	4,100	3,830	3,920
3	75,100	14,400	7,710	5,100	4,100	3,830	3,830
4	54,800	14,000	7,710	5,000	3,920	3,740	3,740
5	40,300	13,700	7,710	5,000	3,830	3,740	3,740
6	33,600	14,000	7,710	5,000	3,830	3,660	3,830
7	29,400	15,500	8,000	5,000	3,830	3,580	3,830
8	25,800	14,000	8,600	4,900	3,830	3,660	3,830
9	24,500	12,900	9,540	4,900	3,740	3,660	3,830
10	22,700	12,600	8,600	4,690	3,830	3,660	3,740
11	21,900	12,200	8,000	4,590	3,830	3,740	3,740
12	21,000	12,200	8,300	4,590	3,830	3,740	3,740
13	19,800	12,200	7,710	4,490	3,830	3,660	3,740
14	19,400	12,200	7,160	4,390	3,830	3,740	3,740
15	18,600	12,900	7,160	4,390	3,740	3,830	3,660
16	17,800	12,900	6,890	4,490	3,740	3,830	3,660
17	17,400	12,900	6,630	4,390	3,660	3,830	3,660
18	16,600	12,600	6,630	4,300	3,740	3,830	3,660
19	16,200	11,900	6,120	4,100	3,660	3,830	3,660
20	15,500	11,200	5,880	4,200	3,660	3,740	3,740
21	14,800	10,500	5,650	4,200	3,740	3,740	3,740
22	14,800	9,860	5,650	4,200	3,660	3,830	3,660
23	14,400	9,540	5,650	4,200	3,660	3,830	3,660
24	14,400	9,220	5,650	4,200	3,660	3,830	3,740
25	15,500	8,910	5,430	4,010	3,660	3,830	3,830
26	16,600	8,910	5,430	3,920	3,740	3,830	3,920
27	17,800	9,220	5,430	3,920	3,660	3,740	4,590
28	17,800	9,220	5,320	4,010	3,660	3,830	4,490
29	16,600	8,910	5,320	4,100	3,740	3,920	4,300
30	16,200	8,300	5,210	4,200	3,740	3,920	4,490
31	----------	8,150	----------	4,200	3,740	----------	4,790
Mean	24,800	11,800	6,890	4,480	3,780	3,770	3,880
Acre-feet for month	1,480,000	726,000	410,000	275,000	232,000	224,000	239,000

TABLE 11

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF—1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	37,000	10,900	5,320	4,300	3,740	3,660	3,660
2	38,400	10,900	5,320	4,300	3,740	3,580	3,580
3	41,100	10,200	5,430	4,300	3,740	3,580	3,660
4	31,800	10,200	5,210	4,300	3,740	3,490	3,830
5	28,000	9,540	5,000	4,200	3,660	3,490	4,010
6	26,200	9,540	5,000	4,200	3,660	3,400	4,010
7	24,900	8,910	4,900	4,200	3,660	3,400	3,920
8	23,600	8,910	4,900	4,200	3,580	3,400	3,830
9	21,400	9,220	4,790	4,200	3,580	3,490	3,830
10	21,000	9,220	4,690	4,200	3,490	3,490	3,740
11	19,400	9,220	4,900	4,100	3,490	3,580	3,660
12	18,600	8,910	5,000	4,100	3,490	3,660	3,660
13	17,000	8,300	5,000	4,100	3,490	3,740	3,660
14	15,900	7,710	4,790	4,100	3,490	3,740	3,660
15	15,500	7,430	4,690	4,100	3,490	3,660	3,740
16	15,500	7,160	4,690	4,010	3,490	3,660	3,740
17	18,600	7,160	4,590	4,010	3,490	3,660	3,740
18	17,000	7,160	4,590	4,010	3,490	3,580	3,740
19	15,900	6,630	4,490	4,010	3,490	3,580	3,920
20	15,100	6,630	4,490	4,010	3,490	3,580	3,830
21	14,000	6,630	4,590	3,920	3,490	3,580	3,830
22	13,700	7,160	4,590	3,920	3,490	3,580	3,740
23	12,900	7,160	4,490	3,920	3,490	3,580	3,740
24	13,700	6,630	4,390	3,920	3,490	3,580	3,830
25	13,300	6,630	4,390	3,830	3,580	3,580	3,830
26	12,600	6,120	4,390	3,830	3,660	3,580	3,830
27	12,200	6,120	4,390	3,830	3,660	3,660	3,830
28	11,500	5,880	4,390	3,830	3,660	3,660	3,830
29	11,200	5,880	4,300	3,830	3,580	3,660	3,830
30	10,900	5,650	4,300	3,740	3,580	3,660	3,920
31	----------	5,430	----------	3,740	3,580	----------	4,100
Mean	19,600	7,840	4,730	4,040	3,570	3,580	3,800
Acre-feet for month	1,170,000	482,000	281,000	248,000	220,000	213,000	234,000

TABLE 12

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	e2,470	1,910	1,800	1,680	1,850	2,690
2	e2,470	1,850	1,800	1,680	1,910	2,550
3	e2,470	1,800	1,850	1,740	1,910	2,550
4	e2,380	1,800	1,800	1,740	1,910	2,550
5	e2,380	1,800	1,800	1,740	1,970	2,690
6	e2,300	1,680	1,740	1,630	2,090	2,900
7	e2,380	1,680	1,740	1,630	2,090	2,980
8	e2,300	1,680	1,740	1,580	2,090	3,050
9	e2,220	1,680	1,740	1,580	2,160	3,200
10	e2,220	1,740	1,740	1,680	2,220	3,120
11	e2,300	1,680	1,740	1,680	2,220	3,120
12	e2,300	1,740	1,680	1,630	2,220	3,200
13	e2,300	1,740	1,630	1,680	2,280	3,200
14	e2,380	1,740	1,630	1,740	2,280	3,200
15	e2,300	1,740	1,680	1,800	2,280	3,200
16	e2,270	1,740	1,680	1,740	2,350	3,420
17	2,220	1,800	1,580	1,740	2,420	3,900
18	2,220	1,850	1,580	1,800	2,420	4,060
19	2,160	1,800	1,530	1,800	2,280	4,060
20	2,090	1,910	1,530	1,850	2,280	3,900
21	2,090	1,910	1,530	1,910	2,350	3,820
22	2,090	1,800	1,580	1,970	2,420	3,820
23	2,160	1,800	1,630	1,970	2,480	3,820
24	2,160	1,850	1,630	1,970	2,550	3,820
25	2,090	1,800	1,630	1,970	2,620	3,900
26	2,160	1,800	1,630	1,970	2,620	3,900
27	2,030	1,800	1,630	1,970	2,620	3,900
28	1,970	1,800	1,630	1,970	2,620	4,060
29	2,030	1,800	1,630	1,970	2,690	5,900
30	2,090	1,800	1,630	1,970	2,760	8,860
31	2,030	----------	1,630	1,850	----------	6,120
Mean	2,230	1,780	1,670	1,790	2,300	3,720
Acre-feet for month	137,000	106,000	103,000	110,000	137,000	229,000

e—Estimated by comparison with Red Bluff record—gaging station not established until May 16.
NOTE—Gagings taken near Butte City bridge, mile 116 above Sacramento.

TABLE 13

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----------	2,860	2,380	2,080	3,600
2	----------	2,780	2,380	2,160	3,510
3	----------	2,700	2,240	2,080	3,510
4	----------	2,700	2,240	2,080	3,700
5	----------	2,700	2,240	2,240	3,600
6	----------	2,540	2,160	2,240	3,790
7	----------	2,460	2,080	2,310	3,880
8	----------	2,380	2,080	2,540	4,280
9	----------	2,380	2,310	2,780	4,280
10	----------	2,310	2,310	2,900	4,280
11	----------	2,160	2,340	2,850	4,180
12	----------	2,010	2,380	2,800	4,280
13	----------	2,310	2,380	2,780	4,280
14	----------	2,860	2,310	2,750	4,280
15	----------	2,780	2,310	2,720	4,280
16	----------	2,780	2,240	2,700	4,280
17	**5,350	2,700	2,240	2,700	4,280
18	5,290	2,540	2,160	2,940	4,380
19	5,180	2,540	2,160	3,700	4,380
20	4,900	2,540	2,160	3,600	4,280
21	4,450	2,540	2,160	3,420	4,180
22	4,280	2,620	2,160	3,260	4,080
23	4,160	2,780	2,080	3,180	4,080
24	4,200	2,700	2,160	3,100	4,080
25	3,600	2,700	2,240	3,100	4,080
26	3,510	2,620	2,310	3,020	4,080
27	3,340	2,620	2,310	3,020	4,080
28	3,180	2,460	2,240	3,260	3,980
29	2,940	2,460	2,160	3,260	4,080
30	2,860	2,460	2,160	3,510	4,080
31	----------	2,310	2,080	----------	4,080
Mean	*4,090	2,560	2,230	2,840	4,070
Acre-feet for month	*114,000	157,000	137,000	169 000	250,000

* 14 days.
** Date gagings were begun.
NOTE—Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement.

TABLE 14

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	3,260	1,880	1,460	1,940	2,940
2	----------	3,180	1,880	1,460	1,820	3,100
3	----------	3,100	1,820	1,410	1,940	3,260
4	----------	3,100	1,880	1,360	2,010	3,340
5	----------	3,000	1,880	1,520	2,080	3,340
6	----------	2,900	1,880	1,310	2,010	3,260
7	----------	2,800	1,820	1,360	2,160	3,340
8	----------	2,700	1,820	1,360	2,240	3,260
9	----------	2,600	1,820	1,360	2,240	3,340
10	----------	2,500	1,760	1,410	2,240	3,340
11	----------	2,500	1,820	1,360	2,240	4,780
12	----------	2,500	1,820	1,310	2,310	5,280
13	----------	2,450	2,080	1,310	2,310	4,480
14	----------	2,400	2,620	1,360	2,460	3,980
15	----------	2,350	1,940	1,360	2,540	3,790
16	----------	2,300	1,880	1,410	2,540	3,980
17	----------	2,240	1,880	1,410	2,540	3,880
18	----------	2,310	1,640	1,520	2,460	3,880
19	----------	2,240	1,580	1,460	2,540	3,790
20	----------	2,240	1,580	1,460	2,540	3,700
21	----------	2,160	1,520	1,520	2,620	3,700
22	----------	2,160	1,460	1,520	2,620	3,700
23	----------	2,160	1,410	1,580	2,660	3,700
24	----------	2,160	1,460	1,580	2,700	3,600
25	----------	2,080	1,460	1,700	2,620	3,600
26	----------	2,010	1,460	1,760	2,700	3,600
27	**3,600	2,010	1,410	1,880	2,780	3,700
28	3,600	1,880	1,360	1,940	2,860	3,700
29	3,600	1,880	1,360	1,940	2,940	3,600
30	3,600	1,880	1,410	1,940	2,940	3,600
31	3,340	----------	1,410	2,160	----------	3,600
Mean	*3,550	2,440	1,710	1,530	2,420	3,690
Acre-feet for month	*35,200	145,000	105,000	94,100	144,000	227,000

* 5 days.
** Date gagings were begun.

TABLE 15

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY—1927

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----------	4,440	2,800	2,660	3,440
2	----------	4,340	2,730	2,730	3,440
3	----------	4,160	2,660	2,800	3,520
4	----------	4,060	2,730	2,880	3,350
5	----------	4,060	2,590	2,800	3,270
6	----------	3,960	2,520	2,800	3,270
7	----------	3,870	2,520	2,730	3,350
8	----------	3,870	2,520	2,730	3,440
9	----------	3,870	2,460	2,730	3,440
10	----------	3,780	2,460	2,800	3,520
11	----------	3,690	2,460	2,800	3,520
12	----------	3,600	2,400	2,880	3,520
13	----------	3,600	2,400	2,880	3,520
14	----------	3,440	2,400	2,880	3,520
15	----------	3,440	2,400	2,960	3,520
16	*6,560	3,350	2,340	3,030	3,520
17	6,340	3,350	2,340	3,110	3,440
18	6,120	3,270	2,340	3,190	3,440
19	5,900	3,190	2,340	3,190	3,520
20	5,580	3,030	2,340	3,190	3,600
21	5,260	3,030	2,340	3,030	3,690
22	4,940	3,030	2,340	3,110	3,690
23	4,900	3,030	2,280	3,190	3,690
24	4,850	3,030	2,340	3,190	3,780
25	4,850	3,030	2,340	3,270	3,780
26	4,800	2,880	2,400	3,270	3,960
27	4,750	2,800	2,400	3,350	4,060
28	4,740	2,730	2,460	3,270	4,540
29	4,640	2,730	2,520	3,350	4,640
30	4,440	2,730	2,590	3,350	4,540
31	----------	2,800	2,590	----------	4,840
Mean	**5,240	3,430	2,460	3,000	3,690
Acre-feet for month	**156,000	211,000	151,000	179,000	227,000

* Start of gagings for season.
** 15 days.

TABLE 16

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	10,800	5,050	3,270	2,340	2,340	3,270
2	10,600	4,840	3,270	2,280	2,400	3,270
3	10,400	4,740	3,190	2,280	2,340	3,270
4	9,950	4,640	3,270	2,220	2,340	3,270
5	9,600	4,540	3,270	2,220	2,280	3,440
6	9,300	4,340	3,190	2,220	2,340	3,600
7	9,100	4,340	3,030	2,220	2,340	3,690
8	8,950	4,160	3,030	2,220	2,400	3,600
9	8,900	4,060	2,960	2,220	2,400	3,520
10	9,000	3,960	2,920	2,220	2,460	3,520
11	9,000	4,010	2,880	2,160	2,520	3,440
12	8,950	4,060	2,880	2,150	2,660	3,440
13	8,600	4,060	2,800	2,130	2,800	3,440
14	8,100	4,060	2,730	2,120	2,960	3,440
15	*7,660	3,870	2,730	2,110	3,030	3,440
16	7,220	3,780	2,660	2,160	3,030	3,520
17	7,220	3,780	2,590	2,160	3,030	3,520
18	6,780	3,690	2,590	2,220	3,030	3,600
19	6,780	3,600	2,520	2,220	3,030	3,520
20	6,560	3,520	2,520	2,160	3,030	3,690
21	6,340	3,520	2,520	2,160	3,030	3,600
22	6,340	3,200	2,590	2,110	3,030	3,600
23	6,780	3,780	2,660	2,110	3,030	3,520
24	6,560	3,650	2,730	2,160	3,030	3,520
25	6,340	3,530	2,730	2,160	3,030	3,520
26	6,010	3,400	2,730	2,220	3,030	3,600
27	5,790	3,270	2,660	2,280	3,110	3,600
28	5,680	3,270	2,590	2,340	3,110	3,600
29	5 470	3,270	2,520	2,340	3,190	3,600
30	5,360	3,270	2,520	2,280	3,190	3,690
31	5,260	----------	2,400	2,280	----------	3,690
Mean	7,730	3,920	2,800	2,210	2,780	3,520
Acre-feet for month	475,000	233,000	172,000	136,000	165,000	216,000

* Record by U. S. Geological Survey after May 15th. Prior record by Water Supervisor.

TABLE 17

DISCHARGE OF SACRAMENTO RIVER AT COLUSA—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	e2,270	1,830	1,710	1,590	1,890	2,660
2	e2,270	1,770	1,710	1,650	1,960	2,660
3	e2,270	1,710	1,770	1,650	1,960	2,480
4	e2,180	1,710	1,770	1,650	2,030	2,480
5	e2,180	1,650	1,710	1,650	1,960	2,660
6	e2,100	1,650	1,770	1,590	2,030	2,850
7	e2,180	1,650	1,710	1,530	2,100	2,950
8	e2,100	1,650	1,710	1,470	2,100	3,050
9	e2,020	1,650	1,710	1,470	2,170	3,150
10	e2,020	1,710	1,650	1,590	2,100	3,250
11	e2,100	1,770	1,650	1,650	2,170	3,150
12	e2,100	1,770	1,650	1,590	2,100	3,150
13	e2,100	1,770	1,650	1,590	2,170	3,250
14	e2,180	1,710	1,590	1,650	2,240	3,350
15	e2,180	1,710	1,590	1,710	2,240	3,350
16	2,170	1,710	1,590	1,710	2,240	3,460
17	2,030	1,710	1,590	1,770	2,310	3,900
18	1,960	1,770	1,530	1,770	2,390	4,380
19	1,890	1,710	1,530	1,770	2,310	4,140
20	1,890	1,710	1,530	1,830	2,310	3,900
21	1,960	1,770	1,470	1,830	2,310	3,790
22	1,890	1,770	1,530	1,830	2,310	3,790
23	1,890	1,710	1,590	1,890	2,390	3,790
24	1,890	1,710	1,530	1,890	2,390	3,790
25	1,890	1,710	1,530	1,960	2,480	3,790
26	1,890	1,710	1,590	1,960	2,570	3,900
27	1,890	1,710	1,590	2,030	2,570	3,900
28	1,890	1,770	1,590	2,030	2,570	3,900
29	1,830	1,770	1,590	2,030	2,570	4,740
30	1,890	1,770	1,590	2,030	2,660	7,680
31	1,890	----------	1,590	2,030	----------	7,380
Mean	2,040	1,720	1,620	1,750	2,250	3,700
Acre-feet for month	125,300	102,000	99,600	108,000	134,000	228,000

e—Estimated by comparison with Red Bluff record—gaging station not established until May 15.
NOTE—Gagings taken near Colusa bridge, mile 89.4 above Sacramento.

TABLE 18

DISCHARGE OF SACRAMENTO RIVER AT COLUSA—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1		2,500	2,210	2,030	3,600
2		2,440	2,300	2,030	3,480
3		2,360	2,120	2,030	3,480
4		2,380	2,080	1,990	3,600
5		2,400	2,030	2,030	3,720
6		2,270	2,030	2,120	3,720
7		2,180	1,910	2,120	3,840
8		2,100	1,870	2,210	4,080
9		2,120	1,990	2,500	4,210
10		*2,210	2,030	2,810	4,210
11		2,160	2,120	2,700	4,080
12		2,030	2,120	2,600	4,080
13		1,950	2,350	2,600	4,080
14		2,400	2,260	2,600	4,210
15		2,500	2,210	2,600	4,210
16		2,500	2,210	2,600	4,210
17		2,500	2,210	2,600	4,210
18		2,400	2,120	2,700	4,210
19		2,350	2,080	3,250	4,210
20		2,400	2,080	3,840	4,210
21		2,350	2,120	3,600	4,210
22		2,400	2,120	3,480	4,080
23		2,500	2,080	3,360	4,080
24		2,500	2,080	3,250	3,960
25		2,500	2,120	3,140	3,960
26		2,600	2,160	3,030	4,080
27		2,500	2,160	2,920	4,080
28		2,450	2,120	3,140	4,080
29		2,350	2,120	3,250	4,080
30		2,350	2,090	3,360	4,080
31		2,260	2,060		4,080
Mean		2,340	2,110	2,750	4,010
Acre-feet for month		144,000	130,000	164,000	247,000

* Discharge prior to this date estimated by comparison with Butte City station. Record started July 10th.

NOTE—Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement.

TABLE 19

DISCHARGE OF SACRAMENTO RIVER AT COLUSA—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	3,140	1,560	1,130	1,910	3,050
2	----------	2,920	1,560	1,130	1,730	3,050
3	----------	2,810	1,500	1,100	1,700	3,250
4	----------	2,700	1,540	1,090	1,730	3,460
5	----------	2,700	1,540	1,090	1,840	3,460
6	----------	2,600	1,540	1,120	1,840	3,350
7	----------	2,400	1,480	1,040	1,910	3,350
8	----------	2,400	1,470	1,060	2,030	3,350
9	----------	2,300	1,440	1,090	2,120	3,250
10	----------	2,210	1,420	1,080	2,160	3,350
11	----------	2,160	1,470	1,090	2,120	4,020
12	----------	2,120	1,490	1,050	2,210	5,220
13	----------	2,210	1,480	1,030	2,260	4,740
14	----------	2,080	2,080	1,040	2,300	4,020
15	----------	1,990	1,800	1,070	2,350	3,680
16	----------	1,910	1,500	1,070	2,400	3,790
17	----------	1,840	1,640	1,080	2,350	3,900
18	----------	1,840	1,400	1,110	2,350	3,900
19	----------	1,800	1,350	1,170	2,350	3,900
20	----------	1,840	1,330	1,180	2,350	3,790
21	----------	1,800	1,300	1,220	2,400	3,790
22	----------	1,700	1,210	1,270	2,350	3,680
23	----------	1,660	1,150	1,300	2,400	3,680
24	----------	1,730	1,130	1,310	2,450	3,680
25	----------	1,730	1,160	1,380	2,500	3,570
26	----------	1,640	1,150	1,460	2,500	3,680
27	**3,600	1,660	1,100	1,540	2,600	3,680
28	3,480	1,620	1,070	1,610	2,600	3,680
29	3,360	1,560	1,060	1,660	2,700	3,680
30	3,360	1,570	1,080	1,700	2,920	3,570
31	3,250	----------	1,130	1,800	----------	3,570
Mean	*3,410	2,090	1,390	1,230	2,250	3,680
Acre-feet for month	*33,800	124,000	85,500	75,600	134,000	226,000

* 5 days.
** Date gagings were begun.

TABLE 20

DISCHARGE OF SACRAMENTO RIVER AT COLUSA—1927

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----	4,220	2,420	2,420	3,400
2	----	4,220	2,420	2,420	3,490
3	----	4,030	2,340	2,420	3,490
4	----	4,030	2,340	2,590	3,580
5	----	3,850	2,340	2,500	3,400
6	----	3,850	2,180	2,500	3,400
7	----	3,670	2,180	2,420	3,400
8	----	3,580	2,180	2,420	3,490
9	----	3,490	2,180	2,420	3,580
10	----	3,580	2,100	2,500	3,580
11	----	3,400	2,100	2,590	3,670
12	----	3,310	2,100	2,590	3,580
13	----	3,220	2,030	2,680	3,580
14	----	3,130	2,030	2,680	3,580
15	----	3,040	2,030	2,770	3,580
16	*6,420	3,040	2,030	2,860	3,580
17	6,220	3,040	2,030	2,860	3,580
18	6,120	3,040	2,000	2,950	3,580
19	5,920	2,950	2,000	3,040	3,580
20	5,520	2,860	1,960	2,950	3,580
21	5,320	2,680	2,000	2,950	3,670
22	4,920	2,680	2,000	2,950	3,670
23	4,820	2,680	1,960	2,950	3,670
24	4,820	2,680	1,960	3,040	3,670
25	4,820	2,680	2,000	3,130	3,670
26	4,720	2,500	2,030	3,130	3,670
27	4,320	2,340	2,100	3,130	3,850
28	4,420	2,340	2,180	3,130	4,030
29	4,420	2,340	2,180	3,220	4,420
30	4,220	2,420	2,260	3,310	4,420
31	----	2,340	2,340	----	4,620
Mean	**5,140	3,140	2,130	2,780	3,680
Acre-feet for month	**153,000	193,000	131,000	165,000	226,000

* Start of gagings for season.
** 15 days.

TABLE 21

DISCHARGE OF SACRAMENTO RIVER AT COLUSA—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	11,400	5,020	3,040	2,180	2,100	3,310
2	11,100	4,820	3,040	2,100	2,180	3,400
3	10,800	4,720	2,950	2,100	2,260	3,400
4	10,500	4,620	2,950	2,030	2,180	3,400
5	10,100	4,620	2,950	2,030	2,180	3,490
6	9,750	4,420	2,950	2,030	2,180	3,580
7	9,500	4,220	2,860	2,030	2,260	3,670
8	9,300	4,120	2,770	2,030	2,260	3,670
9	9,100	3,940	2,770	2,030	2,260	3,580
10	9,150	3,850	2,770	2,000	2,340	3,580
11	9,150	3,760	2,680	2,000	2,420	3,490
12	9,150	3,760	2,680	2,000	2,500	3,490
13	8,900	3,850	2,630	2,000	2,590	3,400
14	8,350	3,760	2,580	1,960	2,770	3,400
15	*7,830	3,670	2,530	1,960	2,860	3,490
16	7,500	3,580	2,470	2,000	2,950	3,490
17	7,280	3,670	2,420	2,030	2,950	3,490
18	7,060	3,490	2,420	2,030	3,040	3,490
19	6,840	3,490	2,340	2,030	3,040	3,490
20	6,620	3,400	2,340	2,030	2,950	3,580
21	6,420	3,310	2,340	2,030	2,950	3,490
22	6,420	3,400	2,340	2,030	3,040	3,490
23	6,420	3,400	2,420	2,000	3,040	3,490
24	6,620	3,400	2,420	2,000	3,130	3,490
25	6,320	3,310	2,420	1,960	3,130	3,490
26	6,020	3,310	2,420	2,030	3,130	3,580
27	5,820	3,130	2,420	2,100	3,130	3,580
28	5,620	3,130	2,340	2,180	3,220	3,670
29	5,420	3,040	2,260	2,180	3,220	3,670
30	5,320	3,040	2,260	2,100	3,310	3,670
31	5,220	----------	2,260	2,100	----------	3,760
Mean	7,910	3,780	2,580	2,040	2,720	3,520
Acre-feet for month	486,000	225,000	159,000	125,000	162,000	216,000

* Record by U. S. Geological Survey after May 15th. Prior record by Water Supervisor.

TABLE 22

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	e2,070	1,550	1,180	1,130	1,920	2,680
2	e2,070	1,450	1,050	1,150	1,820	2,740
3	e2,070	1,400	1,030	1,150	1,820	2,740
4	e1,980	1,400	1,150	1,220	1,870	2,680
5	e1,980	1,350	1,130	1,220	1,920	2,740
6	e1,900	1,350	1,050	1,280	1,920	2,860
7	e1,980	1,400	1,130	1,220	1,920	3,100
8	e1,900	1,400	1,180	1,200	2,040	3,340
9	e1,820	1,350	1,180	1,180	2,090	3,470
10	e1,820	1,280	1,150	1,150	2,140	3,600
11	e1,900	1,250	1,150	1,200	2,090	3,540
12	e1,900	1,400	1,100	1,220	2,140	3,470
13	e1,900	1,500	1,100	1,200	2,200	3,470
14	e1,800	1,450	1,200	1,200	2,260	3,540
15	1,700	1,450	1,130	1,250	2,320	3,540
16	1,870	1,500	982	1,320	2,320	3,600
17	1,870	1,500	958	1,400	2,380	3,800
18	1,870	1,550	1,030	1,450	2,440	4,060
19	1,820	1,600	1,100	1,450	2,500	4,320
20	1,700	1,550	1,130	1,500	2,500	4,250
21	1,650	1,500	1,150	1,600	2,560	4,180
22	1,650	1,500	1,100	1,700	2,620	4,120
23	1,650	1,400	982	1,870	2,620	4,120
24	1,700	1,280	1,050	1,980	2,680	4,060
25	1,760	1,200	1,100	2,040	2,680	4,060
26	1,760	1,300	1,080	2,090	2,740	4,120
27	1,760	1,280	1,050	1,980	2,800	4,180
28	1,760	1,200	1,100	1,870	2,740	4,120
29	1,760	1,200	1,080	2,040	2,680	4,320
30	1,650	1,220	1,050	2,040	2,620	4,980
31	1,650		1,080	1,980		6,260
Mean	1,830	1,390	1,090	1,490	2,310	3,740
Acre-feet for month	112,400	82,700	67,000	91,600	137,000	230,000

e—Estimated by comparison with Red Bluff record—gage not established until May 15.

NOTE—The gagings are taken at the Sacramento River railroad bridge at Knights Landing at mile 34.0 above Sacramento and therefore include the water entering the river from the back borrow pit of Reclamation District 787.

TABLE 23

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	8,400	3,050	2,210	2,140	4,070
2	8,280	3,050	2,210	2,140	4,150
3	8,160	2,980	2,210	2,210	4,230
4	9,000	2,910	2,080	2,280	4,230
5	9,960	2,840	1,960	2,280	4,390
6	10,200	2,840	1,960	2,420	4,390
7	9,480	2,770	1,960	2,560	4,470
8	8,880	2,630	1,900	2,700	4,630
9	8,400	2,560	1,840	2,910	4,870
10	7,800	2,490	1,960	3,120	4,950
11	7,560	2,350	2,020	3,350	4,870
12	*7,060	2,210	2,080	3,350	4,790
13	6,510	2,080	2,140	3,350	4,790
14	6,150	1,960	2,350	3,270	4,870
15	5,890	2,140	2,350	3,190	4,790
16	5,560	2,350	2,280	3,190	4,710
17	5,400	2,350	2,210	3,270	4,630
18	5,370	2,350	2,140	3,430	4,630
19	5,230	2,350	2,080	3,670	4,550
20	5,130	2,280	2,080	3,990	4,470
21	5,150	2,280	2,080	4,150	4,470
22	4,710	2,210	2,140	4,150	4,470
23	4,280	2,350	2,140	4,070	4,470
24	4,250	2,350	2,210	3,990	4,390
25	4,160	2,350	2,210	3,910	4,310
26	3,990	2,420	2,210	3,830	4,230
27	3,910	2,490	2,280	3,750	4,150
28	3,670	2,490	2,350	3,750	4,150
29	3,510	2,420	2,280	3,830	4,150
30	3,270	2,350	2,210	3,910	4,150
31	----------	2,350	2,210	----------	4,150
Mean	6,310	2,470	2,140	3,270	4,470
Acre-feet for month	375,000	152,000	132,000	195,000	275,000

* Discharge prior to this date estimated by using U. S. Weather Bureau daily gage readings. Record started June 12th.

NOTE—Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement

TABLE 24

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1		3,430	1,600	1,100	2,280	3,670
2		3,190	1,660	1,130	2,350	3,670
3		2,980	1,660	1,180	2,350	3,750
4		2,910	1,600	1,150	2,350	3,750
5		2,840	1,600	1,150	2,490	3,830
6		2,770	1,600	1,130	2,630	3,870
7		2,770	1,600	1,150	2,630	3,910
8		2,630	1,500	1,130	2,630	3,830
9		2,490	1,450	1,150	2,770	3,670
10		2,490	1,400	1,180	2,980	3,670
11		2,490	1,400	1,150	3,050	3,670
12		2,490	1,450	1,220	3,120	4,230
13		2,420	1,450	1,250	3,190	4,950
14		2,420	1,400	1,250	3,270	4,710
15		2,350	1,660	1,300	3,270	4,310
16		2,210	1,720	1,400	3,350	4,070
17		2,210	1,500	1,450	3,430	4,070
18		2,080	1,500	1,450	3,430	4,150
19		2,080	1,400	1,550	3,430	4,150
20		2,080	1,300	1,550	3,430	4,150
21		2,080	1,200	1,600	3,350	4,150
22		2,080	1,200	1,660	3,350	4,110
23		1,960	1,150	1,690	*3,390	4,060
24		1,900	1,160	1,720	*3,440	4,010
25		1,900	1,170	1,720	*3,410	3,960
26		1,840	1,180	1,840	*3,360	3,910
27	[1]4,150	1,780	1,180	1,960	*3,410	3,990
28	3,990	1,780	1,130	2,020	*3,400	4,070
29	3,830	1,720	1,050	2,130	*3,480	4,070
30	3,750	1,600	1,080	2,240	3,670	3,990
31	3,670		1,080	2,350		3,990
Mean	**3,880	2,330	1,390	1,480	3,090	4,010
Acre-feet for month	**38,500	139,000	85,500	91,000	184,000	247,000

* Estimated by comparison with Colusa and back borrow pit discharge at Knights Landing.
** 5 days.
[1] Date gagings were begun.

TABLE 25

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING—1927

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----------	4,140	2,620	2,740	3,900
2	----------	4,020	2,570	2,740	4,020
3	*6,720	4,020	2,520	2,790	4,020
4	6,720	3,960	2,460	2,840	4,020
5	6,780	3,900	2,520	2,960	4,020
6	6,840	3,780	2,460	3,010	4,020
7	7,080	3,620	2,350	3,060	3,960
8	7,320	3,510	2,350	3,060	3,960
9	7,500	3,450	2,350	2,960	4,020
10	7,680	3,400	2,300	2,960	4,020
11	7,800	3,400	2,300	2,960	4,020
12	7,680	3,280	2,240	3,060	4,140
13	7,560	3,180	2,240	3,060	4,140
14	7,440	3,120	2,240	3,120	4,080
15	7,200	3,010	2,300	3,180	4,080
16	6,900	2,960	2,300	3,280	4,080
17	6,720	2,960	2,240	3,400	4,020
18	6,360	2,900	2,240	3,500	3,960
19	6,060	2,840	2,240	3,620	4,020
20	5,700	2,840	2,240	3,670	4,080
21	5,400	2,840	2,240	3,670	4,080
22	5,220	2,790	2,240	3,670	4,080
23	5,040	2,790	2,130	3,720	4,080
24	4,920	2,790	2,130	3,840	4,080
25	4,860	2,790	2,240	3,840	4,020
26	4,860	2,740	2,300	3,780	4,140
27	4,680	2,680	2,300	3,670	4,260
28	4,500	2,570	2,400	3,670	4,440
29	4,380	2,570	2,460	3,780	4,680
30	4,260	2,520	2,460	3,840	4,860
31	----------	2,570	2,570	----------	4,980
Mean	**6,220	3,160	2,340	3,320	4,140
Acre-feet for month	**345,000	194,000	144,000	198,000	255,000

* Start of gagings for season.
** 28 days.

TABLE 26

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	11,100	5,500	3,080	2,300	2,350	3,500
2	11,100	5,340	3,140	2,300	2,400	3,500
3	10,900	5,270	3,020	2,250	2,510	3,570
4	10,600	4,970	2,960	2,200	2,620	3,500
5	10,100	4,740	3,020	2,100	2,680	3,570
6	9,800	4,600	2,960	2,050	2,780	3,640
7	9,600	4,390	2,900	2,000	2,840	3,700
8	9,500	4,180	2,840	2,000	2,840	3,760
9	9,500	4,040	2,780	2,050	2,840	3,640
10	9,400	3,900	2,730	2,000	2,900	3,700
11	9,500	3,830	2,620	2,000	2,960	3,700
12	9,600	3,760	2,620	1,910	3,140	3,640
13	9,400	3,760	2,620	1,910	3,320	3,570
14	*9,140	3,900	2,620	1,910	3,440	3,570
15	8,600	3,900	2,560	1,860	3,640	3,570
16	8,100	3,900	2,560	1,860	3,760	3,500
17	7,780	3,760	2,540	1,860	3,830	3,440
18	7,460	3,700	2,520	1,910	3,830	3,570
19	7,220	3,570	2,500	1,960	3,830	3,640
20	7,140	3,440	2,480	2,000	3,760	3,640
21	6,980	3,380	2,460	2,000	3,700	3,700
22	6,980	3,320	2,440	2,000	3,640	3,700
23	6,980	3,320	2,420	2,000	3,570	3,640
24	6,980	3,380	2,400	2,000	3,640	3,640
25	6,980	3,380	2,400	2,000	3,570	3,640
26	6,660	3,320	2,460	2,000	3,570	3,700
27	6,500	3,140	2,460	2,100	3,570	3,700
28	6,260	3,020	2,510	2,150	3,500	3,760
29	5,940	3,020	2,460	2,250	3,500	3,760
30	5,800	3,080	2,460	2,300	3,440	3,700
31	5,640	----------	2,400	2,350	----------	3,760
Mean	8,310	3,890	2,640	2,050	3,270	3,630
Acre-feet for month	510,000	231,000	162,000	126,000	195,000	223,000

* Record by U. S. Geological Survey after May 14th. Prior record by Water Supervisor.

TABLE 27

DISCHARGE OF SACRAMENTO RIVER AT VERONA—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	20,800	5,940	2,240	1,600	3,020	5,630
2	19,800	5,660	2,340	1,640	3,170	5,720
3	18,600	5,360	2,340	1,760	3,240	5,900
4	17,600	5,150	2,300	1,680	3,300	6,020
5	17,300	4,940	2,290	1,700	3,460	6,000
6	19,900	4,880	2,300	1,680	3,640	6,040
7	20,600	4,700	2,220	1,720	3,600	5,990
8	20,100	4,350	2,110	1,700	3,450	5,900
9	19,100	4,110	2,080	1,730	3,660	5,780
10	17,700	4,200	2,090	1,780	3,950	5,840
11	16,000	4,220	2,080	1,660	4,030	5,960
12	14,700	4,060	2,150	1,700	4,130	6,800
13	13,700	3,870	2,180	1,790	4,220	7,400
14	12,700	3,800	2,080	1,810	4,290	7,080
15	12,000	3,560	2,370	1,870	4,500	6,530
16	11,300	3,320	2,440	2,000	4,740	6,170
17	10,500	3,320	2,180	2,020	4,910	6,080
18	9,920	3,170	2,120	2,000	5,060	6,080
19	9,600	3,080	2,020	2,120	5,180	6,080
20	9,440	3,100	1,780	2,180	5,330	6,170
21	9,300	3,140	1,720	2,250	5,240	6,040
22	8,940	3,080	1,720	2,340	5,400	5,960
23	8,560	2,940	1,660	2,410	5,690	5,930
24	8,270	2,890	1,610	2,450	5,700	5,900
25	7,960	2,800	1,690	2,400	5,570	5,820
26	7,670	2,730	1,780	2,460	5,510	5,660
27	7,460	2,610	1,740	2,650	5,450	5,720
28	7,040	2,570	1,580	2,770	5,240	5,810
29	6,740	2,470	1,510	2,970	5,450	5,800
30	6,480	2,330	1,530	3,130	5,560	5,640
31	6,290	----------	1,560	3,160	----------	5,600
Mean	12,780	3,745	1,994	2,101	4,523	6,034
Acre-feet for month	785,000	223,000	123,000	129,000	269,000	371,000

NOTE—This station is located at Mile 19.6 above Sacramento below the junction of the Feather with Sacramento River. It is just above the mouth of "Cross Canal," main drain of Reclamation District 1001, and is only a short distance above the upstream limit of the tide effect.

TABLE 28

DISCHARGE OF SACRAMENTO RIVER AT VERONA—1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	45,000	17,200	7,500	3,760	4,000	6,010
2	43,600	16,800	7,150	3,760	4,120	6,170
3	41,300	16,600	6,980	3,640	4,120	6,010
4	39,100	17,000	6,810	3,640	4,240	5,850
5	37,000	17,400	6,490	3,640	4,370	6,170
6	36,000	18,200	6,170	3,520	4,240	6,170
7	35,400	19,300	5,850	3,520	4,370	6,170
8	34,000	20,400	5,710	3,410	4,370	6,170
9	32,300	21,100	5,430	3,410	4,240	6,330
10	29,800	21,100	5,430	3,410	4,240	6,330
11	28,200	21,300	5,430	3,410	4,240	6,170
12	27,300	21,300	5,290	3,410	4,500	6,490
13	27,700	20,800	5,150	3,410	4,240	6,650
14	29,500	20,600	4,890	3,410	4,370	6,650
15	32,000	20,000	4,760	3,520	4,630	6,650
16	36,400	18,900	4,760	3,410	4,760	6,490
17	35,300	17,800	4,760	3,410	4,890	6,330
18	36,000	16,800	4,630	3,410	5,020	6,010
19	34,800	15,600	4,500	3,520	5,150	6,330
20	31,800	14,200	4,500	3,520	5,020	6,330
21	29,200	13,000	4,500	3,520	5,290	6,330
22	26,000	12,200	4,500	3,520	5,430	6,490
23	23,000	11,600	4,500	3,300	5,570	6,490
24	21,000	11,000	4,370	3,300	5,710	6,330
25	20,500	10,800	4,370	3,410	5,850	6,010
26	21,000	10,600	4,240	3,520	5,710	6,330
27	21,800	9,840	4,240	3,520	5,430	6,650
28	22,000	9,120	4,000	3,640	5,570	6,980
29	21,100	8,580	4,000	3,640	5,850	7,150
30	19,700	8,040	3,760	3,640	5,850	7,320
31	18,400	----------	3,880	3,880	----------	7,500
Mean	30,200	15,900	5,110	3,520	4,850	6,420
Acre-feet for month	1,850,000	946,000	314,000	216,000	289,000	395,000

NOTE—Commencing June 1, 1927, thisstation maintained by U. S. Geological Survey under cooperative agreement.

TABLE 29

DISCHARGE OF SACRAMENTO RIVER AT VERONA—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	25,300	8,960	4,500	3,280	3,280	5,260
2	25,500	8,790	4,500	3,280	3,380	5,260
3	24,800	8,400	4,260	3,280	3,590	5,400
4	23,400	8,010	4,260	3,280	3,700	5,400
5	22,000	7,620	4,380	3,080	3,810	5,400
6	21,300	7,230	4,140	2,980	3,920	5,540
7	21,200	6,840	4,030	2,880	4,030	5,680
8	21,100	6,540	4,030	2,780	4,030	5,680
9	21,000	6,240	4,030	2,880	4,140	5,540
10	20,600	5,960	3,810	2,880	4,140	5,400
11	20,500	5,680	3,700	2,780	4,260	5,540
12	20,100	5,540	3,700	2,780	4,380	5,400
13	19,500	5,680	3,700	2,780	4,620	5,400
14	18,800	5,680	3,700	2,780	4,870	5,400
15	18,000	5,680	3,700	2,680	5,130	5,540
16	17,100	5,680	3,700	2,680	5,400	5,260
17	*16,400	5,540	3,380	2,680	5,400	5,260
18	15,600	5,260	3,280	2,780	5,400	5,540
19	14,800	5,130	3,280	2,780	5,400	5,680
20	14,400	5,000	3,480	2,880	5,400	5,680
21	14,000	4,740	3,590	2,980	5,260	5,820
22	14,000	4,620	3,590	2,880	5,260	5,820
23	13,600	4,620	3,700	2,980	5,260	5,680
24	13,400	4,740	3,590	2,980	5,400	5,820
25	13,000	4,620	3,480	2,980	5,260	5,820
26	12,400	4,500	3,700	2,880	5,260	5,820
27	11,800	4,140	3,700	2,980	5,260	5,960
28	11,000	4,140	3,700	2,980	5,260	6,100
29	10,200	4,140	3,590	3,080	5,260	6,100
30	9,660	4,260	3,480	3,180	5,260	5,820
31	9,300	----------	3,380	3,280	----------	5,960
Mean	17,200	5,800	3,780	2,950	4,700	5,610
Acre-feet for month	1,060,000	345,000	232,000	181,000	280,000	345,000

* Record by U. S. Geological Survey after May 17th. Prior record by Water Supervisor.

TABLE 30

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	5,000	1,830	922	893	1,910	3,370
2	5,090	1,690	858	1,010	1,790	3,520
3	5,330	1,680	832	1,020	1,850	3,560
4	4,850	1,660	957	1,020	1,880	3,490
5	4,420	1,520	932	1,020	1,900	3,590
6	4,390	1,520	789	1,060	1,920	3,880
7	4,360	1,550	930	1,010	1,970	4,470
8	4,260	1,480	930	1,020	1,970	4,980
9	4,310	1,330	935	1,010	2,130	4,950
10	4,450	1,200	870	1,010	2,180	4,900
11	4,010	1,160	915	1,010	2,289	4,950
12	4,010	1,300	892	1,010	2,500	5,060
13	4,300	1,300	889	982	2,630	4,980
14	3,730	1,270	952	1,020	2,790	4,940
15	3,450	1,260	869	1,080	2,810	5,210
16	3,840	1,320	735	1,170	2,800	5,310
17	3,770	1,320	705	1,270	2,790	5,470
18	3,650	1,370	824	1,280	3,000	5,730
19	3,500	1,420	928	1,260	3,000	5,950
20	3,240	1,400	919	1,370	3,130	5,960
21	3,120	1,330	*1,210	1,520	3,220	5,790
22	2,980	1,360	*1,140	1,670	3,280	5,760
23	3,750	1,210	*1,030	1,810	3,260	5,710
24	2,600	1,070	*1,000	1,910	3,290	5,700
25	2,620	988	932	1,940	3,400	5,830
26	2,550	1,100	893	2,020	3,480	5,890
27	2,500	1,100	874	1,950	3,570	5,920
28	2,410	990	930	1,890	3,520	5,950
29	2,330	974	838	2,060	3,460	7,620
30	2,050	977	826	2,060	3,300	11,700
31	1,950	----------	921	2,000	----------	10,200
Mean	3,640	1,323	909	1,366	2,700	5,495
Acre-feet for month	223,900	78,720	55,900	84,030	160,700	338,000

* The marked increase in flow on these days was largely due to the removal of a dam in Sacramento Slough and the consequent rapid release of a large quantity of stored drainage water.

NOTE—This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed by adding to the measured Knights Landing discharges the measured inflow of return water and the Feather and American rivers and subtracting therefrom the measured diversions between Knights Landing and Sacramento. A regular gaging station could not be maintained at Sacramento because of tidal action. Four tidal cycle measurements were taken during the season near Sacramento. (See Table 62).

TABLE 31

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	18,300	6,970	3,430	2,870	6,070
2	17,900	6,920	3,360	3,100	6,340
3	17,500	6,640	3,200	3,090	6,320
4	18,400	6,440	2,870	3,210	6,310
5	19,900	6,310	2,760	3,230	6,330
6	20,500	6,420	2,830	3,390	6,120
7	18,500	5,870	2,830	3,500	6,820
8	17,600	5,670	2,820	3,620	7,720
9	16,700	5,360	2,850	4,010	7,910
10	15,700	5,240	2,780	4,380	7,660
11	15,000	4,970	2,760	4,620	7,300
12	14,500	4,680	2,940	4,790	7,160
13	13,900	4,230	3,340	4,770	7,390
14	13,600	3,840	3,640	4,710	7,830
15	12,800	4,040	3,480	4,480	7,730
16	11,800	4,230	3,440	4,440	7,410
17	11,400	4,150	3,230	4,610	7,220
18	11,200	4,060	2,870	4,920	7,080
19	11,300	4,110	2,870	5,530	6,730
20	11,300	3,760	2,840	5,640	6,450
21	11,100	3,750	3,000	5,620	6,710
22	10,300	3,950	2,880	5,720	6,780
23	9,380	3,950	2,940	5,760	6,600
24	9,040	3,800	3,070	5,550	6,540
25	8,820	3,800	2,790	5,660	6,490
26	8,410	3,950	2,910	5,470	6,260
27	8,000	3,740	3,150	5,520	5,950
28	7,350	3,590	3,110	5,330	6,140
29	7,890	3,660	2,990	5,490	6,260
30	7,200	3,560	3,020	6,010	6,190
31	----------	3,520	2,910	----------	6,030
Mean	13,200	4,680	3,030	4,640	6,740
Acre-feet for month	78,200	288,000	186,000	276,000	416,000

NOTE—This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed by adding to the measured Knights Landing discharges the measured inflow of return water and the Feather and American rivers and subtracting therefrom the measured diversions between Knights Landing and Sacramento. A gaging station cannot be maintained at Sacramento because of tidal action. Two tidal cycle measurements were taken during the season near Sacramento. (See Table 63).

TABLE 32

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	23,000	7,230	2,170	1,480	3,020	5,870
2	21,800	6,960	2,270	1,430	3,140	6,020
3	20,500	6,600	2,370	1,560	3,210	6,230
4	19,600	6,300	2,360	1,510	3,370	6,390
5	22,200	5,920	2,210	1,560	3,490	6,300
6	25,200	5,800	2,170	1,480	3,610	6,370
7	24,700	5,560	2,050	1,540	3,570	6,380
8	23,500	5,180	2,090	1,530	3,480	6,280
9	22,300	5,020	2,030	1,620	3,750	6,140
10	20,700	4,990	2,020	1,620	4,020	6,250
11	19,000	4,920	2,040	1,470	4,170	6,520
12	17,400	4,590	2,030	1,510	4,210	7,490
13	16,400	4,350	2,070	1,690	4,270	7,970
14	15,500	4,210	2,070	1,670	4,340	7,570
15	15,000	3,850	2,290	1,780	4,690	6,980
16	14,400	3,660	2,310	1,920	4,860	6,620
17	13,500	3,540	2,020	1,850	5,160	6,520
18	12,900	3,420	2,040	1,880	5,290	6,570
19	12,700	3,330	1,830	2,030	5,390	6,460
20	12,900	3,520	1,570	2,160	5,580	6,540
21	12,500	3,300	1,540	2,140	5,500	6,430
22	11,700	3,230	1,700	2,260	5,720	6,330
23	11,300	3,080	1,440	2,350	6,030	6,300
24	10,700	2,990	1,420	2,340	5,970	6,290
25	9,920	2,780	1,550	2,290	5,860	6,110
26	9,290	2,810	1,530	2,350	5,790	5,930
27	8,890	2,600	1,500	2,570	5,780	5,980
28	8,350	2,500	1,460	2,640	5,430	6,090
29	8,080	2,620	1,330	2,940	5,690	6,140
30	8,010	2,320	1,370	3,060	5,860	5,890
31	7,650	----------	1,520	3,150	----------	5,840
Mean	15,500	4,240	1,880	1,980	4,670	6,410
Acre-feet for month	951,000	250,000	116,000	122,000	278,000	394,000

NOTE—This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed by adding to the measured Verona discharges the measured inflow of return water and American River and subtracting therefrom the measured diversions between Verona and Sacramento. A gaging station can not be maintained at Sacramento because of tidal action.

TABLE 33

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO—1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	57,700	22,700	9,650	3,970	4,230	6,390
2	54,900	22,400	9,340	4,020	4,240	6,560
3	52,900	22,900	9,050	3,840	4,190	6,390
4	51,000	24,000	8,820	3,830	4,430	6,260
5	49,300	25,100	8,460	3,800	4,470	6,580
6	48,700	26,900	7,840	3,690	4,470	6,620
7	46,100	29,000	7,360	3,680	4,550	6,620
8	42,700	30,300	7,210	3,690	4,620	6,640
9	40,400	29,500	6,740	3,560	4,390	6,790
10	38,100	29,800	6,740	3,590	4,470	6,700
11	37,000	30,200	6,620	3,560	4,380	6,580
12	37,200	29,900	6,490	3,650	4,660	6,880
13	38,900	30,000	6,350	3,550	4,490	7,070
14	41,900	29,900	5,920	3,550	4,670	7,100
15	45,900	28,600	5,690	3,740	4,900	7,080
16	51,800	27,700	5,780	3,540	5,000	6,860
17	51,100	25,900	5,660	3,550	5,120	6,690
18	49,400	23,200	5,430	3,510	5,250	6,480
19	46,000	21,600	5,210	3,670	5,430	6,790
20	41,700	19,500	5,190	3,590	5,330	6,750
21	37,100	18,000	5,060	3,670	5,620	6,730
22	32,400	17,000	5,020	3,650	5,750	6,930
23	28,800	16,100	4,980	3,420	5,920	6,880
24	27,600	15,500	4,850	3,430	6,050	6,690
25	28,800	15,600	4,850	3,470	6,160	6,400
26	30,300	14,900	4,750	3,600	6,060	6,720
27	30,800	13,300	4,640	3,560	5,800	7,120
28	30,100	12,000	4,360	3,710	5,970	7,840
29	27,600	11,000	4,370	3,720	6,270	7,920
30	25,400	10,200	4,010	3,730	6,240	7,920
31	23,800	----------	4,150	4,010	----------	8,100
Mean	40,200	22,400	6,150	3,660	5,100	6,870
Acre-feet for month	2,470,000	1,334,000	378,000	225,000	304,000	423,000

NOTE—This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed by adding to the measured Verona discharges the measured inflow of return water and American River and subtracting therefrom the measured diversions between Verona and Sacramento. A gaging station can not be maintained at Sacramento because of tidal action.

TABLE 34

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	33,500	11,100	4,770	3,240	3,240	5,540
2	33,800	10,800	4,740	3,240	3,350	5,520
3	32,800	10,300	4,590	3,240	3,560	5,720
4	31,400	9,740	4,590	3,240	3,660	5,690
5	29,700	9,160	4,540	3,010	3,840	5,710
6	29,100	8,810	4,350	2,850	3,970	5,860
7	28,900	8,360	4,240	2,810	4,080	5,980
8	28,800	7,980	4,180	2,770	4,110	5,980
9	28,400	7,530	4,130	2,860	4,250	5,890
10	27,800	7,360	3,900	2,820	4,200	5,740
11	27,500	6,790	3,800	2,750	4,350	5,890
12	26,800	6,700	3,770	2,730	4,460	5,720
13	26,000	6,680	3,820	2,640	4,780	5,740
14	25,000	6,590	3,700	2,630	5,050	5,760
15	24,100	6,660	3,730	2,510	5,330	5,890
16	22,900	6,340	3,690	2,590	5,660	5,640
17	22,000	6,290	3,350	2,590	5,620	5,680
18	21,200	5,830	3,320	2,670	5,590	5,950
19	20,200	5,820	3,300	2,750	5,560	6,110
20	19,400	5,470	3,430	2,790	5,640	6,150
21	18,900	5,250	3,560	2,840	5,480	6,140
22	18,300	5,070	3,530	2,780	5,500	6,080
23	18,200	5,120	3,670	2,970	5,430	6,000
24	17,500	5,180	3,610	2,970	5,540	6,140
25	16,900	5,010	3,540	2,940	5,450	6,140
26	16,900	4,950	3,730	2,810	5,460	6,180
27	15,500	4,470	3,710	2,900	5,490	6,290
28	14,600	4,450	3,780	2,920	5,470	6,410
29	13,400	4,330	3,660	3,010	5,560	6,360
30	12,500	4,520	3,480	3,060	5,570	6,190
31	12,000		3,340	3,180		6,370
Mean	23,000	6,760	3,850	2,880	4,850	5,950
Acre-feet for month	1,416,000	402,000	237,000	177,000	288,000	366,000

NOTE—This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed by adding to the measured Verona discharges the measured inflow of return water and American River and subtracting therefrom the measured diversions between Verona and Sacramento. A gaging station can not be maintained at Sacramento because of tidal action.

TABLE 35

DISCHARGE OF BUTTE CREEK NEAR EAST SIDE HIGHWAY—1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1		138	1		7	17
2		140	1		7	17
3		142	Dry		8	17
4		145			8	17
5		75			9	17
6		66			9	18
7		57			10	20
8		48			10	25
9		39			11	22
10		30			11	20
11		22			12	19
12		21			12	18
13		20			13	18
14		19			13	18
15		18			13	18
16		17			13	19
17		16			13	19
18		15			14	19
19		14		Dry	14	19
20		13		1	14	19
21	*116	12		1	14	20
22	118	11		2	14	20
23	120	10		2	15	20
24	122	9		3	15	20
25	124	8		3	15	20
26	126	7		4	15	20
27	128	6		4	16	20
28	130	4		5	16	20
29	132	3		5	16	20
30	134	2		6	16	20
31	136			6		20
Mean	126	38	1	4	12	19
Acre-feet for month	2,740	2,230	4	83	738	1,180

* Gage established May 21st.

NOTE—This record is estimated from current meter measurements and occasional staff gage readings. Station is located at bridge one mile west of the East Side Highway.

TABLE 36

DISCHARGE OF BUTTE CREEK NEAR EAST SIDE HIGHWAY—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	170	7.0				2
2	168	6.0				15
3	161	6.0				25
4	154	5.0				25
5	147	5.0				25
6	140	4.0				20
7	133	4.0				20
8	126	4.0				25
9	119	4.0			Dry	35
10	112	4.0			3.7	50
11	105	3.6			3.2	80
12	100	3.4			2.7	80
13	95	3.2			2.2	75
14	90	3.0			1.7	75
15	84	2.8			1.2	75
16	78	2.6			0.6	75
17	73	2.4			Dry	75
18	68	2.2			Dry	75
19	63	2.0			Dry	75
20	58	1.7			0.3	75
21	53	1.4			0.6	75
22	48	1.1			0.9	75
23	43	0.8			1.2	75
24	38	0.5			1.5	75
25	33	Dry			1.2	75
26	28				0.9	75
27	22				0.6	75
28	17				0.5	75
29	12				0.5	75
30	10				1.0	75
31	8					75
Mean	82	2.7	0	0	0.8	59
Acre-feet for month	5,060	158	0	0	48.6	3,620

TABLE 37

DISCHARGE OF BUTTE CREEK NEAR EAST SIDE HIGHWAY—1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	188	20	4	2	3
2	----------	177	18	3	2	3
3	----------	167	16	3	2	3
4	----------	175	14	2	2	3
5	----------	183	12	2	2	3
6	----------	191	10	2	2	3
7	----------	200	8	2	2	3
8	----------	208	7	3	2	3
9	----------	200	6	3	2	3
10	----------	160	4	3	2	3
11	----------	120	4	3	2	4
12	*363	80	3	3	2	4
13	374	60	2	3	2	4
14	385	40	2	3	2	4
15	374	35	2	3	3	4
16	363	33	3	4	3	4
17	352	31	3	4	4	4
18	341	29	3	4	4	5
19	330	27	4	4	4	5
20	319	25	4	4	4	5
21	308	24	4	4	4	5
22	297	22	5	4	4	5
23	286	20	5	4	4	5
24	274	15	5	4	4	5
25	263	15	6	4	4	5
26	252	16	6	4	4	6
27	241	16	6	3	4	10
28	231	17	5	3	4	14
29	220	17	5	3	4	20
30	209	18	4	3	4	24
31	198	----------	4	3	----------	28
Mean	**299	8.3	6.5	3.3	3.0	6.5
Acre-feet for month	**11,900	4,980	397	200	179	397

* Beginning of record for season.
** 20 days.

TABLE 38

DISCHARGE OF BUTTE CREEK NEAR EAST SIDE HIGHWAY—1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	----------	290	31	2	0	1	8
2	----------	255	28	3	0	1	8
3	----------	225	25	4	0	1	9
4	----------	198	22	4	0	2	10
5	----------	178	19	5	0	2	11
6	----------	160	16	5	0	2	12
7	----------	145	15	6	0	2	13
8	----------	132	14	6	0	2	13
9	----------	120	14	6	0	2	14
10	----------	110	14	5	0	3	14
11	----------	108	15	5	0	3	15
12	----------	106	15	4	0	3	15
13	----------	104	15	4	0	4	15
14	----------	102	16	4	0	4	15
15	----------	100	15	4	0	4	15
16	----------	98	15	3	0	4	16
17	----------	95	14	3	0	4	16
18	----------	92	13	3	0	4	16
19	----------	90	13	2	0	4	16
20	----------	88	12	2	0	5	16
21	----------	86	11	2	0	5	16
22	----------	85	10	1	0	5	16
23	----------	84	9	1	0	5	17
24	----------	83	8	0	0	5	17
25	----------	82	6	0	0	5	17
26	----------	75	4	0	0	5	17
27	----------	68	2	0	0	6	17
28	*440	60	1	0	0	6	17
29	385	52	1	0	0	6	18
30	335	43	1	0	0	7	18
31	----------	34	----------	0	0	----------	18
Mean	**387	114	13 1	2 7	0	3 7	14 7
Acre-feet for month	**2,300	7,040	782	167	0	222	903

* Beginning of record for season
** Three days.

TABLE 39

DISCHARGE OF FEATHER RIVER AT NICOLAUS—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	e1,100	219	46	1	42	626
2	e1,090	220	58	0	36	729
3	e1,060	221	50	0	32	729
4	e870	222	55	0	27	705
5	e770	223	47	0	31	717
6	e910	224	38	0	29	860
7	e890	225	40	0	35	1,120
8	e830	219	43	0	32	1,370
9	e840	129	39	0	42	1,420
10	e810	109	38	0	52	1,280
11	e670	115	36	0	109	1,140
12	e650	149	32	0	203	1,280
13	e830	111	34	0	334	1,240
14	e740	86	28	0	435	1,160
15	e740	75	19	0	470	1,420
16	824	64	17	0	435	1,460
17	762	65	28	0	402	1,420
18	732	67	35	0	505	1,420
19	630	83	33	14	515	1,370
20	582	81	32	51	505	1,460
21	565	67	27	46	535	1,370
22	560	59	21	25	565	1,420
23	535	54	16	13	565	1,370
24	495	52	16	12	560	1,420
25	470	46	12	12	658	1,550
26	420	38	19	7	681	1,550
27	360	41	15	8	693	1,500
28	316	46	10	16	717	1,550
29	288	49	8	30	717	1,500
30	260	49	4	32	609	5,100
31	225	----------	1	39	----------	3,140
Mean	672	114	28.9	9.9	352	1,430
Acre-feet for month	41,300	6,780	1,780	609	20,900	87,900
Monthly diversions below Nicolaus	159	69	58	72	224	0
Discharge to Sacramento River in acre-feet	41,140	6,711	1,722	537	20,680	87,900

e—Discharge estimated from the record of flow at Oroville. Gaging station not established until May 15, 1924. Gagings at 9.6 miles above mouth of river.

TABLE 40

DISCHARGE OF FEATHER RIVER AT NICOLAUS—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	5,600	1,320	782	449	1,460
2	5,600	1,360	740	540	1,620
3	5,450	1,220	665	580	1,460
4	5,760	1,220	503	540	1,560
5	6,560	1,100	540	540	1,460
6	6,400	1,060	540	530	1,220
7	6,080	990	521	485	1,740
8	5,450	1,140	530	454	2,380
9	4,860	1,140	521	540	2,300
10	4,580	1,140	449	740	2,070
11	4,180	1,180	350	728	1,860
12	4,050	1,140	467	872	1,680
13	3,800	1,020	680	884	1,860
14	*3,860	848	824	872	2,220
15	3,630	976	764	734	2,220
16	3,320	1,020	704	728	2,000
17	3,200	990	600	884	1,930
18	3,080	920	404	990	1,930
19	3,140	962	440	1,220	1,680
20	3,100	824	476	990	1,560
21	2,880	680	498	836	1,740
22	2,580	902	458	908	1,740
23	2,440	908	503	1,060	1,680
24	2,320	896	494	990	1,680
25	2,260	908	334	1,060	1,680
26	2,080	920	467	1,100	1,510
27	1,980	812	560	1,100	1,260
28	1,700	680	550	990	1,460
29	1,560	812	485	955	1,510
30	1,360	812	485	1,410	1,460
31	----------	782	512	----------	1,360
Mean	3,760	957	543	824	1,720
Acre-feet for month	224,000	58,800	33,400	49,000	106,000
Monthly diversions below Nicolaus	100	1,600	1,800	500	----------
Discharge to Sacramento River, acre-feet	223,900	57,200	31,600	48,500	106,000

* Discharge prior to this date estimated by using U. S. Weather Bureau daily gage readings. Record started June 14th.

NOTE—Gagings at Nicolaus Bridge, Mile 9.6 above mouth of river. Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement.

TABLE 41

DISCHARGE OF FEATHER RIVER AT NICOLAUS—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	1,860	449	359	426	1,740
2	----------	1,680	467	404	595	1,860
3	----------	1,620	454	341	640	2,000
4	----------	1,510	436	350	630	2,000
5	----------	1,510	440	372	665	1,620
6	----------	1,510	408	341	665	1,800
7	----------	1,410	372	341	440	1,800
8	----------	1,140	386	364	359	1,800
9	----------	1,140	418	418	590	1,800
10	----------	1,260	476	368	698	1,800
11	----------	1,220	555	278	670	2,620
12	----------	1,100	540	346	752	2,800
13	----------	990	449	382	812	2,300
14	----------	934	535	382	600	1,860
15	----------	782	516	436	806	1,680
16	----------	782	458	426	920	1,620
17	----------	800	485	359	1,020	1,560
18	----------	752	472	336	1,100	1,560
19	----------	740	413	364	1,260	1,560
20	----------	734	305	400	1,410	1,800
21	----------	710	264	408	1,180	1,680
22	----------	645	314	462	1,620	1,620
23	----------	630	328	494	1,620	1,680
24	----------	585	341	422	1,620	1,680
25	----------	530	418	386	1,620	1,620
26	3,960	512	422	413	1,560	1,360
27	3,560	508	314	426	1,460	1,680
28	2,980	490	264	449	1,260	1,620
29	2,620	454	260	472	1,560	1,560
30	2,380	440	296	545	1,620	1,560
31	2,300	----------	300	444	----------	1,560
Mean	*2,970	966	405	396	1,010	1,780
Acre-feet for month	*35,300	57,500	24,900	24,300	60,100	109,000
Monthly diversions below Nicolaus	----------	600	300	800	100	----------
Discharge to Sacramento River, acre-feet	*35,300	56,900	24,600	23,500	60,000	109,000

* Six days.

TABLE 42

DISCHARGE OF FEATHER RIVER AT NICOLAUS—1927

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	8,100	2,800	794	896	1,740
2	8,100	2,540	680	878	1,800
3	8,200	2,540	770	842	1,510
4	8,520	2,540	734	884	1,410
5	9,280	2,380	722	800	1,860
6	10,300	2,000	675	686	1,930
7	11,000	1,930	746	794	2,070
8	11,600	1,800	680	866	2,140
9	12,300	1,740	595	902	2,140
10	11,200	1,740	716	902	1,860
11	11,200	1,620	692	908	1,680
12	11,200	1,560	686	948	2,220
13	11,100	1,510	645	635	2,300
14	11,100	1,410	830	848	2,220
15	10,600	1,360	782	955	2,300
16	10,000	1,460	670	990	2,300
17	9,320	1,510	728	1,060	1,930
18	8,750	1,310	710	1,020	1,680
19	*8,010	1,310	788	908	2,220
20	6,830	1,310	776	665	2,300
21	6,140	1,410	866	934	2,220
22	6,140	1,510	686	1,180	2,460
23	6,140	1,410	565	1,310	2,380
24	5,700	1,310	630	1,410	2,000
25	5,700	1,220	728	1,410	1,800
26	5,370	1,260	740	1,220	2,460
27	4,590	1,220	670	1,140	2,710
28	3,860	1,180	686	1,510	2,980
29	3,460	1,060	650	1,740	2,620
30	3,070	914	565	1,740	2,380
31	----------	955	788	----------	2,300
Mean	8,230	1,610	709	1,030	2,130
Acre-feet for month	489,000	99,000	43,600	61,300	131,000
Monthly diversions below Nicolaus	12	836	1,690	44	6
Discharge to Sacramento River, acre-feet	489,000	98,200	41,900	61,300	131,000

* Record by U. S. Geological Survey begun June 19th. Prior record by Water Supervisor.

TABLE 43

DISCHARGE OF FEATHER RIVER AT NICOLAUS—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	3,240	1,080	785	615	1,400
2	----------	2,840	910	910	570	1,260
3	----------	2,640	710	860	615	1,550
4	----------	2,240	960	810	615	1,630
5	----------	2,150	1,020	710	660	1,630
6	----------	2,240	760	530	660	1,630
7	----------	2,060	910	432	660	1,630
8	----------	2,150	960	415	615	1,550
9	----------	1,880	910	397	615	1,400
10	----------	1,470	660	380	615	1,630
11	----------	1,550	810	362	710	1,630
12	----------	1,550	810	362	810	1,710
13	----------	1,630	910	380	910	1,710
14	----------	1,550	1,140	328	960	1,710
15	----------	1,400	860	310	1,140	1,710
16	*7,540	1,260	810	328	1,260	1,400
17	7,060	1,140	490	380	1,260	1,550
18	6,820	1,020	600	415	1,140	1,630
19	6,460	910	710	450	1,260	1,790
20	6,340	1,020	910	490	1,330	1,790
21	6,340	1,020	1,020	450	1,330	1,790
22	6,220	960	1,080	570	1,260	1,710
23	6,100	910	1,020	570	1,330	1,630
24	5,430	1,080	1,020	530	1,330	1,790
25	5,150	1,020	1,020	490	1,260	1,880
26	4,870	860	1,020	432	1,330	1,880
27	4,590	710	1,020	432	1,400	2,060
28	4,320	710	1,020	380	1,400	2,340
29	4,050	860	960	470	1,470	1,880
30	3,780	1,020	860	530	1,470	1,630
31	3,510	----------	660	570	----------	1,790
Mean	**5,540	1,500	891	499	1,020	1,690
Acre-feet for month	**176,000	89,300	54,800	30,700	60,700	104,000
Monthly diversions below Nicolaus	12	74	726	1,109	110	5
Discharge to Sacramento River, acre-feet	**176,000	89,200	54,100	29,600	60,600	104,000

* Start of gagings for season.
** Sixteen days.

TABLE 44

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO—1924

Day	Daily discharge in second-feet					
	*May	*June	July	August	September	October
1	2,190	390	72	0.0	30	47
2	2,330	348	110	8.0	26	47
3	2,610	388	78	9.5	27	47
4	2,330	377	52	9.0	29	45
5	2,050	269	54	5.5	29	47
6	1,920	261	52	5.5	30	70
7	1,790	251	47	7.5	32	154
8	1,850	236	35	5.5	31	172
9	2,050	217	41	2 2	31	207
10	2,190	215	31	1.0	31	154
11	1,790	181	24	2.2	31	158
12	1,850	129	24	6.0	72	196
13	1,920	*103	22	9.0	57	172
14	1,540	110	18	15	46	140
15	1,420	136	17	17	36	154
16	1,480	168	16	12	28	154
17	1,480	154	14	8.0	18	168
18	1,450	149	12	6.0	18	177
19	1,420	149	11	5.0	24	186
20	1,300	145	10	9.0	26	177
21	1,250	136	10	17	20	168
22	1,130	140	10	18	35	149
23	870	129	16	17	41	149
24	772	122	10	31	40	149
25	740	110	6.5	47	38	156
26	724	118	3.0	34	40	154
27	684	94	1.4	36	47	180
28	628	84	14	44	44	230
29	550	72	13	41	41	1,750
30	494	88	5.5	36	54	1,550
31	400	----------	1 0	32	----------	800
Mean	1,460	182	27	16	35	162
Acre-feet for month	89,600	10,800	1,650	990	2,090	16,100
Monthly diversions below gaging station	100	144	163	140	100	11
Discharge to Sacramento River in acre-feet	89,500	10,660	1,487	850	1,990	15,990

Gaging station located at "H" Street Bridge, Sacramento.

* Discharge for May and for June 1 to 12, inclusive, estimated from the Fairoaks record by comparison. "H" Street station not established until June 13.

TABLE 45

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	4,100	2,580	471	239	273
2	3,740	2,460	478	305	316
3	3,730	2,240	408	253	422
4	3,380	2,150	348	300	335
5	3,200	2,180	357	273	316
6	3,740	2,260	363	311	316
7	2,690	1,930	372	354	429
8	3,030	1,710	382	294	542
9	*3,200	1,540	391	354	580
10	3,180	1,520	400	316	492
11	3,070	1,400	410	311	450
12	3,150	1,330	422	305	558
13	3,460	1,160	513	342	598
14	3,460	1,060	415	305	606
15	3,180	938	380	305	606
16	2,810	880	380	278	590
17	2,680	847	289	262	565
18	2,630	858	267	267	478
19	2,790	836	311	267	401
20	2,860	662	294	257	387
21	2,890	814	361	284	450
22	2,880	825	272	316	506
23	2,560	740	253	294	380
24	2,370	638	267	294	398
25	2,250	606	244	380	416
26	2,250	580	257	289	434
27	2,060	478	239	335	450
28	1,880	450	212	284	436
29	2,880	485	207	408	436
30	2,560	478	229	464	415
31	----------	478	203	----------	380
Mean	2,960	1,200	335	308	450
Acre-feet for month	176,000	73,500	20,600	18,300	27,600
Monthly diversions below gaging station	100	100	100	----------	----------
Discharge to Sacramento River, acre-feet	175,900	73,400	20,500	18,300	27,600

* Discharge prior to this date estimated by comparison with Fair Oaks record. Record started June 9th.

TABLE 46

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	2,260	1,580	356	229	229	229
2	2,050	1,620	356	172	217	278
3	1,960	1,500	395	229	223	304
4	2,040	1,390	350	229	253	278
5	4,950	1,340	284	178	253	265
6	5,350	1,240	241	194	194	304
7	4,180	1,200	229	205	166	362
8	3,570	1,190	304	188	178	356
9	3,280	1,190	304	166	229	330
10	3,140	1,160	291	194	205	382
11	3,070	1,000	304	166	217	473
12	2,760	938	278	188	200	660
13	2,840	840	291	194	178	540
14	2,900	728	304	194	178	460
15	3,100	698	330	211	205	421
16	3,140	652	284	183	211	421
17	3,100	622	265	172	217	408
18	3,110	585	247	205	253	395
19	3,240	652	217	205	217	350
20	3,460	720	217	205	211	336
21	3,280	555	217	194	217	356
22	2,870	555	241	200	265	343
23	2,770	492	217	178	272	336
24	2,540	428	229	183	265	356
25	2,140	395	217	200	278	265
26	1,820	395	166	178	259	247
27	1,660	388	172	161	247	241
28	1,580	356	205	161	183	253
29	1,580	460	217	183	223	253
30	1,660	382	211	183	217	229
31	1,600	----------	229	166	----------	211
Mean	2,810	842	264	190	222	343
Acre-feet for month	173,000	50,100	16,200	11,700	13 200	21,100
Monthly diversions below gaging station	----------	100	100	100	----------	----------
Discharge to Sacramento River, acre-feet	173,000	50,000	16,100	11,600	13,200	21,100

TABLE 47

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO—1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	*12,800	5,560	2,560	560	410	410
2	11,400	5,820	2,510	520	395	410
3	11,800	6,410	2,390	540	350	400
4	12,000	7,270	2,320	525	350	420
5	12,500	7,940	2,250	505	358	420
6	12,800	9,000	2,070	480	385	420
7	10,700	9,850	1,900	480	390	420
8	8,820	10,050	1,810	475	405	420
9	8,210	8,520	1,720	470	395	400
10	8,520	8,820	1,670	485	375	334
11	8,970	9,040	1,520	465	366	370
12	10,100	8,700	1,580	480	380	400
13	11,400	9,470	1,490	460	354	400
14	12,600	9,470	1,390	455	395	420
15	14,000	8,900	1,310	455	385	400
16	15,500	8,950	1,300	425	380	380
17	15,800	8,370	1,200	440	385	370
18	13,400	6,710	1,100	415	362	420
19	11,300	6,270	1,040	370	366	470
20	9,870	5,610	953	405	400	440
21	8,010	5,210	908	370	420	420
22	6,570	5,140	855	350	390	420
23	5,900	4,820	806	358	390	420
24	6,730	4,820	785	385	390	390
25	8,500	5,000	738	380	354	420
26	9,490	4,580	778	400	390	420
27	9,170	3,770	744	338	400	500
28	8,230	3,140	702	346	450	890
29	6,590	2,750	630	354	445	750
30	5,800	2,510	588	362	420	630
31	5,520	----------	576	400	----------	630
Mean	10,100	6,750	1,360	434	388	452
Acre-feet for month	621,000	402,000	83,700	26,700	23,100	27,800
Monthly diversions below gaging station	32	45	76	65	21	3
Discharge to Sacramento River, acre-feet	621,000	402,000	83,600	26,600	23,100	27,800

* Prior to May 1st Sacramento River back water affected rating at this station.

TABLE 48

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO—1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	----------	8,430	2,450	650	283	231	284
2	----------	8,430	2,330	580	294	211	284
3	----------	8,160	2,210	650	294	221	305
4	----------	8,160	2,100	580	283	203	305
5	----------	7,900	1,990	510	237	252	305
6	----------	7,900	1,990	510	206	262	340
7	----------	7,900	1,990	580	252	242	305
8	----------	7,900	1,880	510	283	221	316
9	----------	7,640	1,770	442	283	221	340
10	----------	7,380	1,770	442	242	211	353
11	----------	7,110	1,550	442	262	190	365
12	----------	6,850	1,550	442	273	203	328
13	----------	6,590	1,440	442	221	231	353
14	----------	6,330	1,340	377	203	252	340
15	----------	6,330	1,340	377	211	273	365
16	----------	6,070	1,050	316	231	294	396
17	----------	5,820	1,050	316	211	252	429
18	----------	5,820	960	377	211	237	429
19	*7,900	5,580	1,050	365	231	221	442
20	7,110	5,150	870	316	203	283	442
21	6,590	5,150	870	322	195	283	316
22	6,330	4,470	870	322	195	262	262
23	6,590	4,760	870	311	262	186	316
24	7,380	4,290	790	409	262	178	316
25	8,160	4,120	790	390	221	252	322
26	6,590	4,760	790	365	195	186	328
27	8,160	3,910	720	340	203	221	328
28	8,700	3,910	720	416	221	242	305
29	8,700	3,480	650	377	203	273	262
30	8,700	3,090	650	316	211	305	365
31	----------	2,960	----------	283	252	----------	403
Mean	**7,560	6,020	1,350	421	236	237	340
Acre-feet for month	**180,000	370,000	80,100	25,900	14,500	14,100	20,900
Monthly diversions below gaging station	0	3	59	69	62	43	22
Discharge to Sacramento River, acre-feet	**180,000	370,000	80,000	25,800	14,400	14,100	20,900

* Prior to April 19th Sacramento River back water affected rating at this station.
** Twelve days.

TABLE 49

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE—1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	e1,430	21	2.1	1.5	1.0	1.2
2	e1,620	18	2.0	1.5	1.0	1.2
3	e1,620	12	1.9	1.5	1.0	1.2
4	e1,490	8.5	1.9	1.4	1.0	1.2
5	e1,140	8.0	1.9	1.4	1.0	1.2
6	e1,140	7.0	1.9	1.4	1.3	1.2
7	e1,140	6.5	1.8	1.3	2.0	1.2
8	e1,250	6.0	1.6	1.3	1.5	1.2
9	e1,490	5.0	1.7	1.3	1.3	1.3
10	e1,490	5.0	1.7	1.3	1.1	1.3
11	e1,250	4.8	1.7	1.3	1.0	1.4
12	e1,140	4.8	1.7	1.3	1.0	1.4
13	e 990	4.6	1.6	1.4	1.2	1.4
14	e 940	4.4	1.5	1.4	1.3	1.4
15	e 890	4.4	1.5	1.3	1.2	1.4
16	e1,090	4.6	1.5	1.3	1.1	1.5
17	e1,040	4.0	1.5	1.3	1.1	1.5
18	e 840	4.0	1.5	1.3	1.1	1.6
19	e 790	4.0	1.5	1.4	1.1	1.7
20	e 640	4.0	1.5	1.3	1.1	1.7
21	e 690	4.0	1.5	1.2	1.1	1.7
22	e 540	3.8	1.5	1.2	1.1	1.7
23	e 365	3.7	1.5	1.2	1.1	1.7
24	e 390	3.2	1.6	1.2	1.1	1.7
25	e 250	2.6	1.6	1.2	1.1	1.7
26	e 182	2.5	1.6	1.1	1.1	1.7
27	102	2.5	1.6	1.1	1.1	1.7
28	95	2.4	1.6	1.2	1.1	1.8
29	69	2.3	1.6	1.0	1.1	1.6
30	50	2.2	1.5	1.0	1.1	53
31	28	----------	1.5	1.0	----------	164
Mean	845	5.66	1.65	1.28	1.15	8.37
Acre-feet for month	51,800	337	101	78.7	68.4	515

e—Estimated by comparison with the record of flow at Clements. Gage not established until May 27, 1924.
NOTE—Gaging station located just below the Woodbridge Irrigation District's dam at Woodbridge.

TABLE 50

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1		*840	2.8	9	5
2		840	2.7	7.5	5
3		750	2.9	10	4.8
4		750	3.0	7	4.8
5		750	2.8	6	4.8
6		795	2.6	6.5	4.8
7		570	2.7	26	4.8
8		425	2.9	22	4.8
9		405	3.3	9	*5
10		285	3.6	8	5
11		235	4.2	14	5
12		165	4.5	12	5
13		*82	11	16	**500
14		71	17	20	250
15		72	16	11	*200
16		84	11	7.5	147
17		78	8	7	167
18		78	5.5	6.5	159
19		87	3.3	6.5	139
20		72	2.9	6	113
21		54	2.9	6.5	95
22		50	2.9	6	95
23		50	2.9	6	94
24		48	2.9	6.5	94
25		47	3.3	7	92
26		45	3.3	7	92
27		112	3.6	6.5	88
28		5.5	4.8	6.5	86
29		5.5	7	6	84
30		4.5	14	5.5	81
31		2.7	24		83
Mean		254	5.95	9.37	88
Acre-feet for month		15,600	366	558	5,370

* Estimate for this period by comparison with the record of flow at Clements.
** Flash boards removed from Woodbridge Irrigation District's dam at Woodbridge just above gaging station.
NOTE—Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement

TABLE 51

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE—1926

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	----------	3,040	576	4.2	3.0	3.0	3.8
2	----------	2,440	620	4.5	3.2	3.0	3.8
3	----------	2,420	598	4.5	3.2	3.2	3.8
4	----------	2,600	494	4.2	3.0	3.3	3.8
5	----------	2,880	444	4.2	2.8	3.6	3.8
6	----------	2,840	406	4.2	2.8	3.8	3.8
7	----------	2,110	378	4.2	2.7	3.2	4.5
8	----------	1,580	351	4.0	2.7	3.0	4.0
9	3,120	1,370	300	3.8	2.7	3.2	3.8
10	2,800	1,140	300	3.6	2.7	3.2	3.6
11	2,400	1,140	232	3.8	2.7	3.5	3.8
12	2,000	1,140	184	3.8	2.7	3.6	4.0
13	1,970	1,210	161	3.6	2.7	3.8	4.2
14	2,220	1,260	123	3.3	2.7	3.6	4.2
15	2,460	1,430	503	3.2	2.7	3.5	4.2
16	2,720	1,550	20	3.0	3.0	3 6	4.7
17	2,960	1,580	12	3.3	2.8	3.8	5.5
18	2,920	1,660	8	3.3	2.7	4.0	5.5
19	2,140	1,720	5	3.5	2.7	4.5	6
20	1,830	1,830	4.7	3.0	2.8	4.5	6
21	2,040	1,800	4.2	3.0	3.0	4.5	6
22	2,360	1,550	3.6	3.5	3.2	4.5	6
23	2,560	1,400	3.3	3.6	2.8	4.5	6
24	2,560	1,260	3.2	3.5	2.7	4.7	5.5
25	2,840	994	3.2	3.2	2.8	5	5
26	3,040	642	3.5	3.3	3.0	5.5	4.7
27	3,080	708	3.8	3.3	3.3	6	4.7
28	2,960	730	4.0	3.2	3.2	4.9	4.7
29	3,080	708	4.2	3.2	3.0	4.5	4.7
30	3,040	730	4.0	3.2	3.0	4.2	4.7
31	----------	664	----------	3.0	3.0	----------	4.7
Mean	*2,600	1,550	192	3.59	2.88	3.97	4.6
Acre-feet for month	*113,000	95,300	11,400	221	177	236	284

* 22 days.

TABLE 52

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE—1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	1,620	4,460	1,860	995	3.2	22	3.8
2	2,160	4,010	2,250	1,040	3.5	20	5.0
3	2,740	3,680	2,130	1,100	5	14	6
4	4,010	3,720	2,670	1,020	9	16	5.5
5	4,320	3,760	3,080	1,100	8	13	5.5
6	3,560	3,960	3,600	481	7.5	11	7.5
7	2,920	4,060	3,880	682	7.5	11	7.5
8	2,640	3,400	4,500	597	6	12	6.5
9	2,390	2,530	4,140	557	3.8	13	8
10	2,130	1,860	3,480	538	3.5	13	8
11	1,860	2,160	3,880	452	5.5	9.5	6
12	1,700	2,530	3,840	443	5.5	9	5
13	1,540	3,040	3,880	396	6	6	6
14	1,440	3,920	4,190	341	5.5	4.0	6
15	1,420	4,920	4,370	306	5.5	2.5	6
16	1,520	4,970	4,010	264	5.5	2.0	4.8
17	1,500	5,220	4,100	247	5.5	1.6	4.0
18	1,370	5,170	3,960	196	6	1.6	3.0
19	1,420	4,460	3,600	150	7.5	1.4	3.0
20	1,570	3,840	3,080	139	8.5	1.4	3.0
21	1,720	2,960	2,670	152	11	1.6	4.0
22	1,920	2,280	2,600	148	12	1.4	4.2
23	2,220	1,860	2,600	130	8.5	1.6	5
24	2,640	1,740	2,250	112	10	2.0	8
25	3,080	2,130	2,190	76	10	2.8	2.8
26	3,800	2,810	2,130	54	10	2.2	2.5
27	4,500	3,480	1,920	560	8.5	2.4	390
28	4,970	3,200	1,500	2.8	14	2.5	452
29	4,550	2,530	1,070	2.8	16	3.2	434
30	4,370	1,890	1,020	2.4	11	4.0	290
31	----------	1,800	----------	3.2	14	----------	223
Mean	2,590	3,300	3,020	396	7.84	6.92	62.1
Acre-feet for month	154,000	203,000	180,000	24,300	482	412	3,820

TABLE 53

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE—1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	3,600	2,700	1,070	3.0	2.8	2.4	3.8
2	3,160	3,120	1,040	3.2	2.6	2.4	3.4
3	3,200	2,960	1,010	3.0	2.6	2.5	2.6
4	3,080	2,640	820	3.0	2.6	2.6	2.6
5	2,700	2,600	750	3.0	2.6	2.4	2.6
6	2,460	2,780	700	2.8	2.6	2.4	2.5
7	2,500	3,040	650	2.6	2.5	3.2	2.6
8	2,430	3,360	610	3.0	2.5	3.4	2.6
9	2,360	3,640	480	3.4	2.6	3.0	2.6
10	2,280	3,360	350	2.4	2.6	2.8	2.8
11	2,250	3,480	390	2.6	2.6	2.6	3.0
12	2,190	3,760	500	2.4	2.4	2.5	3.0
13	2,300	3,600	400	2.8	2.5	2.5	3.0
14	2,420	3,360	280	2.8	2.5	2.4	3.0
15	2,300	3,080	220	2.8	2.4	2.4	9
16	2,190	2,840	170	3.0	2.3	2.6	12
17	2,190	2,670	128	2.6	2.3	2.6	12
18	2,080	2,500	71	2.8	2.3	2.6	9
19	1,980	2,320	68	2.4	2.4	3.6	6.5
20	1,980	2,250	95	2.4	3.0	3.1	6.5
21	1,820	2,250	83	2.2	2.4	3.8	6.5
22	1,670	2,130	61	2.4	2.3	3.7	7
23	1,670	1,980	52	2.6	2.3	3.8	5.5
24	1,670	1,950	46	3.2	2.6	4.2	4.8
25	2,040	2,010	26	3.0	2.5	4.0	4.4
26	1,800	2,010	11	3.1	2.3	4.0	4.6
27	1,950	1,950	5	3.0	2.3	3.8	8.5
28	2,250	1,800	5	3.0	2.3	3.8	13
29	2,600	1,600	5	3.1	2.4	3.8	17
30	2,600	1,500	3.6	3.1	2.4	3.8	19
31	----------	1,200	----------	3.0	2.4	----------	18
Mean	2,320	2,590	337	2.83	2.48	3.09	6.56
Acre-feet for month	138,000	159,000	20,100	174	152	184	403

TABLE 54

DISCHARGE OF MOKELUMNE RIVER AT THORNTON—1926

Day	Daily discharge in second-feet			
	July	August	September	October
1	----------	10	8.5	9.5
2	----------	10	8 5	10
3	----------	10	8.5	9
4	----------	9.5	8.5	9
5	----------	9.5	8 5	9
6	*15	10	9	9
7	14	10	9 5	8 5
8	13	9.5	9	8 5
9	13	9 5	9	9
10	14	9 5	8 5	10
11	14	9 5	8 5	10
12	12	9	8 5	9 5
13	13	9	8 5	9 5
14	13	7.5	9	9.5
15	13	8 5	9	9.5
16	12	8 5	9	9
17	12	8.5	9	9.5
18	12	8 5	9	9 5
19	12	8.5	9	9.5
20	12	8 5	8	9 5
21	12	8 5	8 5	10
22	12	8 5	9.5	10
23	9 5	8 5	9	10
24	11	8 5	9	10
25	11	8	7.5	10
26	11	8	8.5	10
27	11	8 5	9.5	10
28	11	8 5	9.5	9.5
29	11	8.5	9.5	9
30	11	8.5	9	9
31	10	8 5	----------	8 5
Mean	12.1	8.90	8.82	9.44
Acre-feet for month	624	547	525	580

* Gage established.

NOTE—This station is located near Thornton at the lowest point on the river which is above tide effect. Station maintained by Water Resources Branch of the U. S. Geological Survey.

TABLE 55

DISCHARGE OF MOKELUMNE RIVER AT THORNTON—1927

Day	Daily discharge in second-feet		
	August	September	October
1	*39	25	13
2	35	30	13
3	31	27	15
4	31	24	15
5	30	24	14
6	29	22	14
7	27	21	15
8	27	21	15
9	24	21	15
10	22	22	15
11	22	22	15
12	21	20	14
13	21	19	13
14	21	18	13
15	21	16	14
16	19	15	14
17	18	15	14
18	17	13	14
19	17	13	13
20	18	13	13
21	19	12	13
22	20	12	14
23	20	12	15
24	20	12	16
25	21	13	18
26	22	13	**17
27	22	13	----------
28	24	13	----------
29	25	13	----------
30	25	13	----------
31	23	----------	----------
Mean	23.6	17.6	***14.4
Acre-feet for month	1,450	1,050	***743

* Record not started until August 1st.
** Recorder removed October 26th.
*** 26 days.

TABLE 56

DISCHARGE OF MOKELUMNE RIVER AT THORNTON—1928

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----	30	11	9.5	8
2	----	29	11	9.5	8
3	----	28	11	9.5	7.5
4	----	28	11	8.5	8
5	----	25	11	8.5	8
6	----	19	11	8	8
7	----	20	11	7.5	8
8	----	21	11	8	8
9	----	22	10	8	7.5
10	----	21	11	8	7
11	----	21	11	8	6.5
12	----	21	11	8	7
13	----	17	10	7.5	8
14	----	13	10	7.5	8.5
15	----	14	9.5	8.5	9
16	----	14	9	8.5	12
17	----	14	9	8.5	15
18	----	14	9	8.5	16
19	----	14	*10	8.5	16
20	----	14	12	8.5	12
21	----	14	11	8	11
22	----	13	10	8.5	12
23	*83	13	9.5	8.5	12
24	95	13	9	8.5	11
25	74	13	9.5	8.5	9.5
26	62	12	9.5	8.5	9.5
27	47	12	9	8.5	9.5
28	33	12	9.5	8.5	13
29	28	12	9	9	17
30	29	12	9	8.5	20
31	----	11	8.5	----	20
Mean	**56.4	17.3	10.1	8.40	10.7
Acre-feet for month	**895	1,060	621	500	658

* Beginning of record for season.
** Eight days.

TABLE 57

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS—1924

Day	Daily discharge in second-feet							
	March	April	May	June	July	August	September	October
1	1,160	1,420	1,000	750	482	419	394	402
2	1,160	1,370	1,000	730	464	422	398	402
3	1,160	1,370	1,200	710	458	433	402	416
4	1,160	1,420	1,570	670	447	440	412	419
5	1,120	1,420	1,670	630	433	430	419	444
6	1,120	1,420	1,870	610	422	426	412	472
7	1,080	1,420	1,770	610	422	426	426	518
8	1,040	1,320	1,520	590	416	426	436	534
9	1,000	1,320	1,370	578	405	422	447	538
10	960	1,370	1,570	582	405	422	433	550
11	960	1,570	1,770	574	402	416	416	558
12	920	1,720	1,820	578	412	412	408	586
13	920	1,980	1,820	578	430	402	405	562
14	885	2,160	1,720	570	430	402	419	542
15	885	2,220	1,570	582	426	394	416	530
16	885	2,160	1,370	570	426	405	412	542
17	885	2,040	1,200	570	419	419	408	578
18	885	1,720	1,160	574	412	422	416	610
19	920	1,420	1,160	558	408	416	422	610
20	885	1,320	1,200	546	408	426	422	586
21	920	1,240	1,120	542	405	430	419	570
22	920	1,200	1,080	538	391	430	422	562
23	920	1,240	1,040	522	394	433	416	554
24	960	1,280	1,000	510	398	430	416	538
25	1,040	1,370	1,000	503	412	433	419	526
26	1,160	1,320	938	496	422	426	419	550
27	1,200	1,240	895	500	422	419	412	554
28	1,200	1,120	830	496	416	416	430	554
29	1,160	1,080	790	496	405	408	416	554
30	1,240	1,040	770	489	408	402	402	554
31	1,370	----------	750	----------	412	405	----------	690
Mean	1,030	1,480	1,280	575	420	420	416	532
Acre-feet for month	63,300	88,100	78,700	34,200	25,800	25,800	24,800	32,700

TABLE 58

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS—1925

Day	Daily discharge in second-feet				
	June	July	August	September	October
1	----------	4,780	930	690	1,320
2	----------	5,130	960	660	1,420
3	----------	5,830	930	810	1,420
4	----------	4,640	930	840	1,380
5	----------	4,220	870	708	1,350
6	**8,960	4,080	840	684	1,350
7	8,480	3,870	780	750	1,350
8	8,000	3,450	750	900	1,350
9	7,420	3,100	810	990	1,380
10	7,400	2,820	810	1,080	1,350
11	7,250	2,540	870	1,180	1,350
12	8,230	2,330	870	1,210	1,420
13	8,320	2,190	870	1,180	1,460
14	8,700	2,020	840	1,180	1,490
15	9,300	1,840	780	1,180	1,520
16	9,400	1,740	810	1,180	1,560
17	8,700	1,600	870	1,180	1,560
18	7,950	1,520	840	1,080	1,520
19	7,530	1,460	810	1,110	1,600
20	7,830	1,380	780	1,110	1,630
21	8,200	1,320	810	1,180	1,740
22	8,250	1,280	780	1,180	1,840
23	8,230	1,240	780	1,210	1,910
24	8,050	1,240	810	1,110	1,910
25	7,600	1,240	810	1,110	1,840
26	7,150	1,240	780	1,110	1,700
27	6,860	1,210	780	1,210	1,800
28	6,460	1,180	750	1,240	1,880
29	6,060	1,180	708	1,210	1,910
30	5,480	1,050	720	1,240	1,910
31	----------	960	720	----------	1,880
Mean	*7,830	2,380	820	1,050	1,580
Acre-feet for month	*387,000	146,000	50,400	62,500	97,200

* 25 days.

** Date gagings were begun.

NOTE—Gaging station located at Durham Ferry Bridge below the junction of Stanislaus and San Joaquin rivers. Station maintained by Water Resources Branch of the U. S. Geological Survey under cooperative agreement.

TABLE 59

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS—1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	3,250	1,020	595	612	612
2	----------	3,180	1,000	595	612	682
3	----------	3,110	980	595	630	718
4	----------	2,900	980	595	665	718
5	----------	2,830	960	595	700	752
6	----------	2,690	920	580	718	900
7	----------	2,550	840	580	735	1,020
8	----------	2,480	805	595	752	1,020
9	----------	2,410	805	612	752	1,050
10	----------	2,270	805	630	788	1,080
11	----------	3,040	822	612	822	1,050
12	----------	2,340	822	612	900	1,080
13	----------	2,140	805	630	920	1,080
14	----------	2,020	788	630	920	1,080
15	----------	1,900	770	612	900	1,110
16	----------	1,780	735	612	900	1,110
17	----------	1,720	718	595	920	1,140
18	----------	1,600	700	595	920	1,140
19	----------	1,600	700	580	920	1,110
20	----------	1,540	682	580	920	1,080
21	----------	1,490	665	580	900	1,110
22	----------	1,490	648	580	880	1,110
23	----------	1,390	648	580	700	1,140
24	----------	1,340	648	595	612	1,180
25	----------	1,240	665	595	565	1,210
26	----------	1,190	665	580	580	1,210
27	----------	1,160	648	612	580	1,210
28	4,140	1,160	648	595	580	1,210
29	3,740	1,120	648	595	580	1,210
30	3,600	1,040	648	630	595	1,210
31	3,460	----------	630	665	----------	1,240
Mean	*3,740	2,000	768	601	753	1,050
Acre-feet for month	*29,700	119,000	47,200	37,000	44,800	64,600

* 4 days.

TABLE 60

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS—1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	10,500	9,900	8,620	1,660	1,660	1,600
2	12,000	9,600	6,860	1,720	1,600	1,660
3	11,500	9,500	6,480	1,600	1,490	1,840
4	10,400	9,300	6,100	1,540	1,490	1,960
5	10,100	9,250	5,720	1,540	1,440	2,020
6	10,100	9,800	5,340	1,490	1,440	2,270
7	11,800	10,700	5,260	1,440	1,440	2,270
8	12,400	11,700	4,460	1,440	1,440	2,080
9	11,800	12,300	3,740	1,440	1,440	2,080
10	11,100	12,800	3,390	1,390	1,440	2,140
11	9,800	12,700	3,110	1,390	1,440	2,200
12	9,600	12,800	2,970	1,340	1,540	2,270
13	9,400	13,000	2,760	1,340	1,540	2,340
14	9,800	13,400	2,590	1,390	1,490	2,410
15	10,800	13,800	2,430	1,390	1,490	2,410
16	11,600	14,100	2,270	1,440	1,490	2,410
17	12,100	14,200	2,200	1,390	1,490	2,410
18	12,700	14,200	2,200	1,340	1,600	2,340
19	13,200	14,300	2,080	1,290	1,600	2,410
20	13,100	13,900	2,020	1,290	1,490	2,550
21	12,700	13,300	1,960	1,290	1,540	2,480
22	11,700	12,400	1,960	1,290	1,540	2,340
23	10,400	11,200	1,960	1,290	1,540	2,340
24	9,300	*10,900	1,900	1,290	1,540	2,200
25	9,000	11,000	1,840	1,290	1,540	1,840
26	10,100	11,100	1,840	1,290	1,600	2,020
27	11,100	11,400	1,780	1,290	1,600	2,140
28	12,100	11,100	1,720	1,340	1,540	2,200
29	12,200	10,500	1,720	1,390	1,600	2,200
30	11,400	9,920	1,660	1,390	1,600	2,270
31	10,400	----------	1,660	1,540	----------	2,340
Mean	11,100	11,800	3,250	1,400	1,520	2,190
Acre-feet for month	683,000	703,000	200,000	86,100	90,400	135,000

* Record by U. S. Geological Survey begun June 24th. Prior record by Water Supervisor.

TABLE 61

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS—1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	5,400	8,300	1,390	980	1,090	1,390
2	6,100	6,660	1,390	960	1,120	1,440
3	5,900	5,300	1,390	980	1,120	1,600
4	5,300	6,000	1,440	960	1,140	1,600
5	4,700	6,660	1,490	980	1,140	1,720
6	5,420	6,550	1,440	1,040	1,240	1,720
7	6,440	5,400	1,340	1,040	1,340	1,720
8	6,720	4,140	1,240	1,000	1,340	1,780
9	6,900	3,900	1,190	960	1,340	1,780
10	6,800	3,670	1,190	920	1,340	1,780
11	6,900	3,250	1,160	900	1,340	1,720
12	6,900	2,970	1,140	880	1,340	1,720
13	7,000	2,690	1,140	880	1,340	1,840
14	7,420	2,520	1,160	880	1,340	1,900
15	7,810	2,340	1,160	880	1,390	1,900
16	7,350	2,140	1,160	880	1,340	1,900
17	6,750	2,080	1,090	900	1,440	1,900
18	6,250	2,020	1,020	880	1,440	2,140
19	6,000	1,900	980	880	1,440	2,200
20	6,100	1,780	940	860	1,390	2,200
21	8,000	1,720	920	880	1,390	2,270
22	8,600	1,720	940	880	1,390	2,200
23	8,800	1,660	960	880	1,390	2,200
24	8,500	1,660	980	860	1,390	2,270
25	9,400	1,660	960	840	1,340	2,270
26	*9,730	1,600	960	840	1,390	2,270
27	10,100	1,540	960	860	1,390	2,270
28	10,400	1,490	980	920	1,340	2,270
29	9,730	1,440	1,000	940	1,340	2,270
30	8,560	1,390	1,020	940	1,390	2,340
31	8,180	----------	1,020	1,020	----------	2,550
Mean	7,360	3,200	1,130	919	1,330	1,970
Acre-feet for month	453,000	190,000	69,500	56,500	79,100	121.000

* Record by U. S. Geological Survey after May 26th. Prior record by Water Supervisor.

TABLE 62

TIDAL CYCLE MEASUREMENTS OF THE SACRAMENTO RIVER NEAR SACRAMENTO—1924

Time of cycle	Mean discharge, second-feet	Tidal range in feet	Maximum flow downstream, second-feet	Corresponding mean velocity downstream, feet per second	Maximum flow upstream, second-feet	Corresponding mean velocity upstream, feet per second
July 16, 4.40 p.m., to July 17, 5.20 p.m.	750	1.70	1,600	.47	1,100	.33
Aug. 7, 12.25 p.m., to Aug. 8, 2.20 p.m.	1,070	1.45	1,780	.63	400	.13
Sept. 8, 9.50 a.m., to Sept. 9, 9.40 a.m.	1,990	1.25	2,780	.82	No Reversal Just 0	No velocity
Oct. 9, 10.10 a.m., to Oct. 10, 11.30 a.m.	4,800	0.50	5,520	* 1.32	Minimum downstream *4,060	Minimum downstream * 96

*No reversal of current during this cycle.

TABLE 63

TIDAL CYCLE MEASUREMENTS OF THE SACRAMENTO RIVER NEAR SACRAMENTO—1925

Time of cycle	Mean discharge second-feet	Tidal range in feet	Maximum flow second-feet	*Minimum flow second-feet
July 20, 12.50 p.m., to July 21, 1.40 p.m.	3,290	0.8	4,050	2,000
Sept. 2, 10.40 a.m., to Sept. 3, 12.30 p.m.	3,080	0.8	3,430	1,870

*There was no reversal of current due to low flow and tidal action in 1925 as was the case in 1924.
NOTE—Measurements taken at a point just below Riverside Mutual Water Company pumping plant, Mile 6.1 Left.

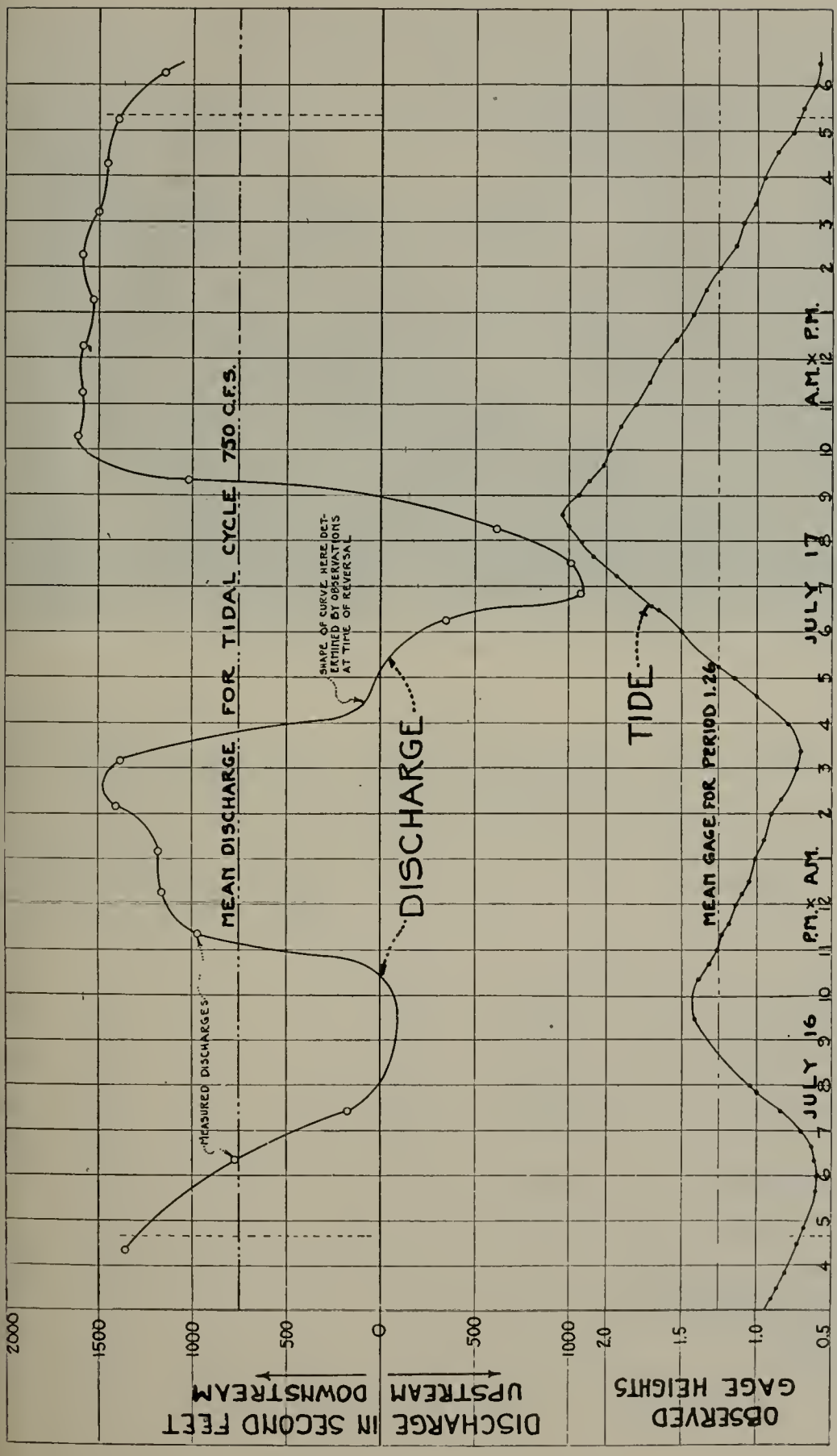

PLATE 1—Relation between Tide and Discharge of the Sacramento River near Sacramento as shown by Tidal Cycle Measurement, July 16–17, 1924.

PLATE 2—Barges of Grain from Up-River Points at City of Sacramento Wharves.

TABLE 64

TIDAL CYCLE MEASUREMENTS IN SACRAMENTO-SAN JOAQUIN DELTA CHANNELS—1925

Channel and point of measurement	Time of cycle	Mean discharge second-feet	Tidal range in feet	Maximum flow down-stream second-feet	Maximum flow upstream second-feet
Sutter Slough near its junction with Sacramento River	Sept. 3, 4.50 p.m., to Sept. 4, 5.10 p.m.	[1]763	2.7	[2]2,600	[1]1,840
Steamboat Slough near its junction with Sacramento River	July 21, 7.00 p.m., to July 22, 7.30 p.m.	[1]515	3.3	[2]2,650	[2]2,500
Georgiana Slough near its junction with Sacramento River	July 23, 9.50 a.m., to July 24, 9.50 a.m.	[1]1,560	2.6	[2]2,880	[3]450
Three-mile Slough just below ferry	July 24, 4.10 p.m., to July 25, 4.40 p.m.	[1]780	4.0	[2]25,000	[2]20,500
Old San Joaquin River above junction with Middle River	July 26, 2.40 p.m., to July 27, 3.35 p.m.	676	2.1	940	[3]0
Middle San Joaquin River below Salmon Slough at Williams bridge	July 27, 7.45 p.m., to July 28, 8.15 p.m.	[4]104	3.2	[4]488	[5]430

[1] Away from Sacramento River.
[2] Toward Sacramento River.
[3] No reversal of current. Flow just reduced to zero for high tide.
[4] To north.
[5] To south.

TABLE 65

APPROXIMATE DISTRIBUTION TO DELTA CHANNELS OF LOW FLOW OF SACRAMENTO AND SAN JOAQUIN RIVERS AS SHOWN BY TIDAL CYCLE MEASUREMENTS—1925

Sacramento River

Location	Discharge Second-feet		Percentage of flow past Sacramento
Flow past Sacramento		3,750	
Estimated diversions down to Sutter Slough	40		
Flow to Sutter Slough	930		25
Flow past Sutter Slough		2,780	74
Flow to Steamboat Slough	520		14
Flow past Steamboat Slough		2,260	60
Estimated diversions down to Georgiana Slough	20		
Flow to Georgiana Slough	1,560		42
Flow past Georgiana Slough		680	18
Estimated diversions down to Three mile Slough	50		
Inflow to River through Cache Slough[1]	1.120		
Flow past Rio Vista		1,750	47
Flow to Three-mile Slough	780		21
Flow past Three-mile Slough		970	26

San Joaquin River

Location	Discharge, Second-feet		Percentage of flow past Vernalis gage
Flow past Vernalis gaging station[2]		1,240	
Diversions down to Old River	20		
Flow to Old River	676		55
Flow past Old River		544	44
Flow from Old River to Middle River		104	8
Flow of Old River past Middle River		572	46
(Flow in Salmon Slough)			

[1] Taken as the sum of flow to Sutter and Steamboat sloughs less diversions from the latter and connecting channels estimated at 330 cubic feet per second.

[2] Located at Durham Ferry Bridge, 3.3 miles below junction of San Joaquin and Stanislaus rivers.

CHAPTER III

MEASUREMENTS OF DIVERSIONS

Measurements and records of diversions in the period 1924 to 1928, inclusive, have included those from the Sacramento River and its tributaries within the valley floor and those to the delta uplands from the San Joaquin River, Old San Joaquin River and Tom Paine Slough. In the five-year period there has been a considerable number of new pumping installations. The total of diversions listed in 1924 was 233 as compared to a total of 377 in 1928. The 1928 diversions segregated to the various sources were as follows: Sacramento River 224, Colusa Trough 11, Back Borrow Pit (carrying drainage water from Colusa Basin along the back levees of Reclamation Districts 108 and 787) 5, Lower Butte Creek and Butte Slough 14, By-pass and Drainage Channels 11, Feather River 36, Yuba River 6, American River 28, Old San Joaquin River to Delta Uplands 10, Tom Paine Slough to Uplands 7, and San Joaquin River to Uplands (below junction with Stanislaus River) 25. In addition, the 1928 San Joaquin Valley diversions (recorded in the return water measurements) totaled 53, as follows: San Joaquin River 11, Merced River 29, Tuolumne River 5, Stanislaus River 6, and Dry Creek 2.

Under the system for obtaining the diversion records, pump operators have kept daily records on blanks furnished by the Water Supervisor. These records are collected monthly by the field engineers at the same time that the readings of the electric meters are recorded. In order to establish the relation between power input and water pumped, as many as possible current meter measurements of discharge are made throughout the season. With the daily operation records available it has been possible to compile from the monthly diversions as computed from the power record, a daily diversion record for each plant. In the case of pumps operated by other than electric power, of which there are only a relatively small number, the diversions have been estimated from current meter measurements and the logs of operation of the pumps. In this bulletin and the tables of this chapter it is only possible to publish the record of monthly diversions for each plant. However, each year the daily diversion records have been compiled as a supplemental report and these reports are on file and available for reference in the office of the Division of Water Rights.

Comparative Stream Flow, Draft and Return Flow.

With complete records of the diversions available as above described it is possible to make some interesting comparisons between stream flow, draft and return flow for the seasons since 1924 when the measurements were started. This has been done in Table 66 for the Sacramento River, Red Bluff to Sacramento.

TABLE 66

COMPARATIVE STREAM FLOW, DRAFT, AND RETURN FLOW FOR SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO

Year	Seasonal run-off Sacramento River and tributaries in per cent of normal	Average discharge in second-feet during July				Maximum monthly draft average second-feet, July each year	July return flow second-feet, column 7 minus column 6	July return in per cent of inflow, column 4
		Sacramento River at Red Bluff	Combined Sacramento at Red Bluff, Feather at Nicolaus, American at Sacramento	Sacramento River at Sacramento	Difference, columns 4 and 5			
1	2	3	4	5	6	7	8	9
1924	27	2,900	2,960	909	2,050	2,780	730	25
1925	77	3,650	5,810	4,680	1,130	3,060	1,930	33
1926	56	3,190	3,860	1,880	1,980	3,850	1,870	48
1927	112	4,480	7,450	6,150	1,300	3,900	2,600	35
1928	77	4,040	5,350	3,850	1,500	3,340	1,840	34

It will be noted that as distinguished from column 2, Table 3, page 11, which gives the run-off percentages for all streams tributary to San Francisco Bay, column 2, Table 66 gives the percentages for Sacramento River and tributaries only. The comparisons are made for the month of July as that month is the one in which the maximum draft has occurred each season. With the total inflow to the section of river from Red Bluff to Sacramento represented by the figures of column 4, and the outflow shown by column 5, the difference, or column 6, would be what was available for irrigation diversions. The actual draft as shown by column 7 greatly exceeds this difference, however, and this excess as shown by column 8 is, therefore, a measure of the return flow to the river. This return, of course, includes that from all sources, both the Sacramento River and foreign diversions, the latter chiefly from the Feather River. Column 9 shows the relation of the return flow to the combined inflow of the Sacramento River at Red Bluff, the Feather at Nicolaus and the American at Sacramento. The draft as given in column 7 differs from that given in column 8, Table 1, page 2, as the latter is the draft from Redding to Sacramento (including Anderson-Cottonwood Irrigation District diversion).

Duty of Water From Diversion Records.

In Table 67, diversion records obtained 1924 to 1928, inclusive, are tabulated in accordance with the various sources, and the corresponding irrigated acreages are shown. From the diversion and acreage data, figures for the gross seasonal duty of water in acre-feet per acre have then been computed, as shown in columns 6 and 11.

In any study of the water situation in the valley as a whole, however, the important duty of water figure is that which represents the net or consumptive use of water rather than the gross duty as derived in Table 67.

TABLE 67

COMPARATIVE DIVERSIONS, ACREAGE IRRIGATED AND SEASONAL GROSS DUTY OF WATER

Year	Seasonal diversions acre-feet	Acreage irrigated			Gross duty of water acre-feet per acre	Seasonal diversions acre-feet	Acreage irrigated			Gross duty of water acre-feet per acre
		Rice	General	Total			Rice	General	Total	
1	2	3	4	5	6	7	8	9	10	11
	Sacramento River, Redding to Sacramento					Feather River below Oroville				
1924	953,000	59,700	104,300	164,000	5.81	355,000	22,500	22,400	44,900	7.91
1925	842,000	58,000	76,200	134,200	6.26	413,000	26,700	25,600	52,300	7.91
1926	1,104,000	87,500	76,600	164,100	6.72	469,000	34,700	23,500	58,200	8.07
1927	1,159,000	79,800	77,900	157,700	7.36	528,000	38,500	24,900	63 400	8.33
1928	1,053,000	63,500	88,200	151,700	6 94	492,000	33,100	23,400	56,500	8 70

	American and Yuba rivers in Valley floor					By-pass and drainage channels				
1924	----------	----------	----------	----------	----------	42,500	5,800	3,300	9,100	4 67
1925	*8,400	----------	5,300	5,300	1 58	34,000	**9,900	1,100	11,000	**3 09
1926	40,500	3,300	6,300	9,600	4 22	31,400	3,200	1,000	4,200	7 48
1927	45,400	1,900	7,300	9,200	4 93	37,500	3,100	7,200	10,300	3.64
1928	42,400	1,900	8,000	9,900	4.28	29,400	2,500	6,200	8,700	3.38

	Delta Uplands from Old River, Tom Paine Slough and San Joaquin River					Delta				
1924	108,000	----------	36,300	36,300	2.98	----------	----------	----------	260,200	----------
1925	84,400	----------	45,300	45,300	1 86	----------	----------	----------	227,100	----------
1926	147,000	----------	53,600	53,600	2 74	----------	----------	----------	264,500	----------
1927	130,000	----------	54,400	54,400	2.39	----------	----------	----------	265,800	----------
1928	132,000	----------	62,400	62,400	2.12	----------	----------	----------	288,500	----------

	Totals, excluding the Delta				
1924	1,458,500	88,000	166,300	254,300	5.72
1925	1,381,800	94,600	153,500	248,100	5.57
1926	1,791,900	128,700	161,000	289,700	6.19
1927	1,899,900	123,300	171,700	295,000	6.44
1928	1,748,800	101,000	188,200	289,200	6.05

*Yuba record incomplete in 1925—Hallwood and Cordua Irrigation Districts not included.
**Colusa Trough rice served also from Sacramento River, exact segregation not possible.

Where the flow returned to the river, comprising chiefly that portion of the diversions which is not consumed, is measured and known, the net duty of water figures may be derived, as shown in column 11, Table 68 which gives these data for the acreage irrigated from the Sacramento River above Sacramento, for the month of July of each season.

Description of the return water measurements, from which the figures of columns 8 and 9 are derived, is given in Chapter IV.

It will be noted that the gross duty and return water figures for 1924 differ considerably from those for the other four years, and that the same figures for each of the latter years appear to be in close agreement. For this reason, in endeavoring to reach what might be an

TABLE 68

DUTY OF WATER—SACRAMENTO RIVER

Year	Total diversions in July, acre-feet	Acreage irrigated			Gross duty, July		Return flow in July		Net diversions in July, acre-feet	Net duty of water in July, acres served per second-foot
		Rice	General	Total	Acre-feet per acre	Acres per second-foot	Per cent of draft	Acre-feet		
1	2	3	4	5	6	7	8	9	10	11
1924	189,100	59,700	104,300	164,000	1.15	54	26	49,000	140,100	72
1925	211,800	58,000	76,200	134,200	1.57	39	53	112,000	99,800	82
1926	259,800	87,500	76,600	164,100	1.58	39	41	106,000	153,800	65
1927	260,000	79,800	77,900	157,700	1.65	37	55	143,000	117,000	83
1928	227,100	63,500	88,200	151,700	1.50	41	43	97,700	129,400	72
Combined 1925–1928 inclusive	958,700	288,800	318,900	607,700	1.58	39	48	458,700	500,000	75

average or representative figure for the net duty of water, the data for 1924 were not included in the combined figures at the bottom of the table. The combined results show, in column 11, a net duty of water of 75 acres served per second-foot. A somewhat theoretical segregation can be made of this figure to rice and general crop duty by using the ratio between net consumptive use of water for rice as determined by exhaustive experiments of the U. S. Department of Agriculture for individual fields on clay soils and the net duty for Sacramento Valley general crops as determined by both federal and state agencies. This ratio may be taken at approximately 5 to 2, that is, 5 acre-feet per acre for rice and 2 acre-feet per acre for general crops. Taking the rice duty at two and one-half times the general crop duty, the figures in the last line of Table 68 give:

$$\frac{318900\,G + 288800\,(2.5\,G)}{607700} = 0.82^*$$

Where G represents the general crop duty.

Solving, G = 0.48 acre-feet per acre = 1 second-foot to 128 acres and rice duty, $2\frac{1}{2}$ G = 1.20 acre-feet per acre = 1 second-foot to 51 acres.

Diversions Classified by Water Rights.

In Table 69 a summarization and segregation of the diversion records has been made to show the use of water under (1) appropriative rights initiated through the Water Commission Act (since 1914), (2) known old appropriative rights (prior to Water Commission Act) and (3) the remaining water users, presumably riparian or old appropriative rights. In the first classification, no diversions were included which it appeared might have been made under riparian claim also, and such diversions were placed under classification (3). It is interesting to note that although there is a very large number of riparian diversions, they are nearly all small ones and the total for this class, as shown in the table, does not exceed 8 per cent of all the diversions, excluding, however, those of the Delta region. The Delta, comprising about 425,000 acres, irrigates from 230,000 to 290,000 acres (see column 10, Table 67), practically all under riparian claims although many filings under the Water Commission Act have been made in this area.

* 75 acres per second-foot is equivalent to 0.82 acre-feet per acre for 31-day month.

TABLE 69

SEASONAL DIVERSIONS UNDER DIFFERENT WATER RIGHT CLASSIFICATIONS IN ACRE-FEET AND PERCENTAGES

Water right	Sacramento River	Feather River	American and Yuba rivers	By-pass and drainage channels	Delta uplands from Old River, Tom Paine Slough and San Joaquin River	Combined sources (excludes the Delta)
1924						
Appropriative Water Commission Act	65% 613,800	9.8% 34,900	*	89% 37,800	32% 34,900	50% 721,400
Known old Appropriative	28% 269,200	89.8% 318,700	*	0 0	51% 55,200	44% 643,100
Presumably Riparian or old Appropriative	7% 70,000	0.4% 1,400	*	11% 4,700	17% 17,900	6% 94,000
1925						
Appropriative Water Commission Act	69% 582,500	4% 18,300	19% 1,600	52% 17,800	44% 37,400	48% 657,600
Known old Appropriative	26% 224,100	95% 391,300	**	0 0	44% 37,400	47% 652,800
Presumably Riparian or old Appropriative	4% 35,400	1% 3,400	81% **6,800	48% 16,200	12% 9,600	5% 71,400
1926						
Appropriative Water Commission Act	60% 663,400	4% 17,900	5% 2,200	80% 25,100	57% 84,100	44% 792,700
Known old Appropriative	33% 366,400	95% 446,700	85% 34,100	0 0	36% 52,400	50% 899,600
Presumably Riparian or old Appropriative	7% 74,200	1% 4,400	10% 4,200	20% 6,300	7% 10,500	6% 99,600
1927						
Appropriative Water Commission Act	60% 696,400	4% 22,500	7% 3,400	45% 17,000	56% 72,900	43% 812,200
Known old Appropriative	30% 342,700	95% 500,700	85% 38,500	0 0	37% 47,600	49% 929,500
Presumably Riparian or old Appropriative	10% 119,900	1% 4,800	8% 3,500	55% 20,500	7% 9,500	8% 158,200
1928						
Appropriative Water Commission Act	67% 708,100	5% 22,200	10% 4,100	83% 24,500	53% 69,900	47% 828,800
Known old Appropriative	28% 294,800	94% 464,700	86% 36,300	0 0	41% 54,400	49% 850,200
Presumably Riparian or old Appropriative	5% 49,800	1% 5,400	4% 2,000	17% 4,900	6% 7,900	4% 70,000

*Data incomplete for 1924.

**Yuba data for 1925 incomplete. Does not include Hallwood and Cordua Irrigation Districts, old appropriative right.

TABLE 70

SUMMARY OF SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, INCLUSIVE (Acre-feet)

River section	March	April	May	June	July	August	Sept.	October	Totals
1924									
Redding to Red Bluff	-------	9,217	12,786	15,996	18,724	18,106	17,273	7,733	99,835
Red Bluff to Butte City	1,220	35,706	78,921	83,102	85,782	72,650	42,630	7,416	407,427
Butte City to Colusa	862	10,130	14,602	12,557	10,807	7,127	8,193	2,874	67,152
Colusa to Knights Landing	2,114	35,850	57,217	52,524	51,654	45,857	19,779	1,795	266,790
Knights Landing to Sacramento	3,128	11,608	20,517	21,894	22,114	19,937	10,101	2,270	111,569
Totals	7,324	102,511	184,043	186,073	189,081	163,677	97,976	22,088	952,773
1925									
Redding to Red Bluff	-------	884	13,333	19,219	23,338	23,330	20,795	4,544	105,443
Red Bluff to Butte City	-------	1,370	29,040	80,671	96,153	92,662	63,346	5,802	369,044
Butte City to Colusa	-------	-------	8,646	15,307	20,949	13,859	9,663	988	69,412
Colusa to Knights Landing	-------	3,834	28,519	51,926	50,046	46,015	29,691	3,440	213,471
Knights Landing to Sacramento	-------	5,089	8,171	17,028	21,302	19,022	10,947	3,334	84,893
Totals	-------	11,177	87,709	184,151	211,788	194,888	134,442	18,108	842,263
1926									
Redding to Red Bluff	-------	6,635	15,257	20,500	22,694	18,529	15,855	7,303	106,773
Red Bluff to Butte City	-------	10,398	102,857	119,951	117,731	105,207	50,054	17,192	523,390
Butte City to Colusa	-------	2,336	27,197	33,474	31,974	26,868	7,929	3,765	133,543
Colusa to Knights Landing	-------	10,239	36,621	58,205	58,384	51,168	15,687	172	230,476
Knights Landing to Verona	-------	767	3,228	3,876	4,854	4,826	2,054	24	19,629
Verona to Sacramento	-------	3,951	9,892	22,883	24,140	20,276	7,053	1,764	89,959
Totals	-------	34,326	195,052	258,889	259,777	226,874	98,632	30,220	1,103,770
1927									
Redding to Red Bluff	-------	2,400	12,152	17,628	20,437	19,469	18,041	13,068	103,195
Red Bluff to Butte City	-------	14,655	100,678	100,456	109,007	104,869	54,628	18,393	502,686
Butte City to Colusa	-------	1,850	21,298	20,284	22,907	19,962	8,893	571	95,765
Colusa to Knights Landing	-------	9,069	58,901	73,352	80,535	72,470	43,401	9,308	347,036
Knights Landing to Verona	-------	102	3,228	5,975	5,531	6,014	3,612	311	24,773
Verona to Sacramento	-------	3,251	10,607	16,421	21,601	19,092	10,894	3,342	85,208
Totals	-------	31,327	206,864	234,116	260,018	241,876	139,469	44,993	1,158,663
1928									
Redding to Red Bluff	-------	2,102	17,736	20,507	21,868	21,649	20,530	8,725	113,117
Red Bluff to Butte City	-------	15,518	98,750	91,526	93,184	91,608	41,243	14,040	445,869
Butte City to Colusa	-------	2,750	13,672	16,866	16,885	12,877	4,195	876	68,121
Colusa to Knights Landing	-------	25,619	58,148	69,981	66,649	62,059	15,632	3,695	301,783
Knights Landing to Verona	-------	329	4,097	5,434	5,677	5,115	1,457	4	22,113
Verona to Sacramento	-------	6,017	15,344	24,947	22,795	21,241	9,057	2,234	101,635
Totals	-------	52,335	207,747	229,261	227,058	214,549	92,114	29,574	1,052,638

TABLE 71

SACRAMENTO RIVER DIVERSIONS—1924

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion, March to October, acre-feet	Acreage irrigated	
			Mareh	April	May	June	July	August	September	October		Rice	General
City of Saeramento	0.2 L	3-20, 1-18	1,820	2,130	2,510	2,580	2 610	2,460	2,210	1,810	18,130	Municipal	
E. Fourness	1.45R	5			8	12	17	8			45		40
G. D. Jones	2.05L	8				64	57	28	2	9	160		183
Frank Christophel	2.4 L	5			13	12	32	6		8	71		35
H. M. Swalley	2.45L	5			10	9	16	2			37		38
Albert Elkus (Sleeper-Lessee)	2.9 L	3						3			3		5
Hayward Reed	3.55R	15	194	194	133	204	56	183	36		1,000	}	350
Hayward Reed	3.6 R	10	24	32	40	60	75	74	25		330		
W. E. M. Beardslee	3.75R	5	1	2	6	14	14	8	3	2	50		13
W. I. Elliott	4.0 R	8			78	83	77	17	15		270		150
Reese and Greer	4.65R	7	1	1	55	67	19	18	23	1	185		100
Harbinson Brothers	5.05R	14		11	13	14	20	4	12	6	80		90
K. L. Lovdal	5.25R	10	1	1	65	79	27	120	4	1	298		160
C. H. Merkeley Estate	5.3 R	8		1		43	27				71		40
A. Casselman	5.5 R	5		1	1	17	1	1	1		22		15
K. L. Lovdal	5.7 R	10	1	150	35	13	60	18	197	2	476		200
Riverside Mutual Water Co.	6.1 L	2-18		459	1,670	1,850	1,830	1,160	1,170	105	8,244		2,652
J. Parkinson	7.5 L	8			43	53	42	43	13		194		100
Martin and Carter (F. J. Stahl)	7.8 L	10		24	43	14	35	40	14		170		90
A. Marty	7.9 R	8			3	15	13	26	7	24	88		50
M. E. and R. F. Bennett	7.9 L	10			35	60	46	39	19		199		90
M. Marty	8.3 R	10			240	185	232	190	155	19	1,021		250
Julius Blauth	8.5 R	5			17	68	89	1	2	12	189		100
H. Waldeck	8.7 R	6		0 2	4	8	6	4	3		25.2		25
T. T. C. Gregory	8.95R	15	74	293	276	289	432	261	19	16	1,660		756
A. A. Merkeley	9.35R	16	13	40	132	180	117	119	100	26	727		180
Pearson and Driver	9.8 L	15			208	155	225	270			858		410
Geo. B. and Carl Casselman	9.9 R	12		42	101	97	63	104	55		462		85
F. W. Kiesel**	10 25L	15		140	570	510	250	250	250	100	**2,070		570
Reese Estate (Ashwandan)	10.75R	12		4	22	13	6	72	144		261		80
Fiddyment and Cahill	10.75L	12		5	37	45	104	112	41	36	380		60
H. L. Hill, Jr. (Taylor)	11.1 R	15		87	328	302	278	89	340		1,424		290
Conaway Ranch	12.0 R	4-36		2,460	2,810	3,650	3,550	3,740	1,440		17,650	2,500	1,540
Elkhorn Mutual Water Co.	14.1 L	1-20, 1-26		370	2,630	2,320	2,410	1,440	880	71	10,121		2,419
A. L. Whitney (O. Farr)	15.7 L	6				19	59	14	4		96		20
Central Mutual Water Company	16.05L	2-38	999	2,310	3,140	2,880	2,760	3,060	605		15,754	1,270	1,103
A. Linggi	18.45L	12				23		11	52		86		40
Natomas Company	19.6 L	30		971	1,990	2,040	2,140	2,160	933	6	10,240	1,193	93
C. S. Luce	22.5 R	18				547	179	20			746		200
Fred Traganza	29.7 R	8			8	19	8	19	8		62		35
Traganza and Russell	29.75R	8				4	18	16	13		51		20
Kendall Ranch	32 0 R	10			15	54	22	27			118		20

Sutter Mutual Water Co. (Portuguese Bend)	32.0 L	2-24	----------	1,840	3,140	3,110	4,010	3,560	1,280	----------	16,940	770	409
Collier Brothers	32.5 R	10	----------	16	18	34	36	42	4	4	154	----------	50
Knox and Leiser	33.75R	15	----------	24	70	79	46	98	22	12	351	----------	120
Meek Estate	34.2 R	2-16, 1-10	----------	1,180	1,770	1,880	1,720	1,610	925	180	9,265	1,150	30
River Farms Co. (Townsite)	34.25R	1-20, 1-24, 1-26	272	1,960	3,350	3,800	3,600	3,600	429	----------	17,011	1,850	603
Fred Van Lew	35.2 L	12	----------	8	8	----------	8	----------	8	----------	32	----------	13
Dr. J. H. Scott (McBride)	35.6 L	8	----------	2	34	26	9	13	22	2	108	----------	30
J. H. Donnelly (Randolph)	35.8 L	10	----------	----------	84	----------	----------	109	73	9	275	----------	65
Sutter Mutual Water Co. (State Ranch Bend)	40.6 L	24	216	----------	1,930	338	----------	1,340	549	----------	4,373	----------	3,150
El Dorado Ranch	43.1 R	14	46	166	295	305	306	288	232	----------	1,638	----------	600
River Farms Co. (R. D. 2047 pumps)	43.1 R	2-50	----------	9,050	13,200	12,500	13,200	11,000	81	----------	59,031	8,000	
P. J. Hiatt	48 7 L	20	282	199	324	2	516	107	----------	----------	1,430	----------	40
G. J. Stam	51.25L	24	17	428	1,160	1,240	444	615	31	17	3,952	----------	800
A. T. Spencer	55.1 L	20	----------	127	46	----------	----------	117	114	187	591	----------	60
River Farms Co. (Boyer Bend)	56.4 R	2-26	34	63	85	627	680	112	----------	----------	1,601	----------	600
J. M. Miller	56.65R	12	----------	----------	52	71	24	41	6	----------	194	----------	60
Sarah Hines	62.3 R	10	----------	----------	16	18	----------	----------	12	----------	46	----------	25
W. M. Baker	62.6 R	8	----------	----------	----------	26	----------	----------	----------	----------	26	----------	17
Reel. District 108 (Wilkins Slough)	63.2 R	5-48	----------	5,140	5,490	5,130	4,410	2,900	2,580	----------	25,650	2,315	3,764
Sutter Mutual Water Co. (Tisdale)	63.75L	6-42	352	12,900	21,400	19,200	19,800	18,700	11,700	1,160	105,212	6,062	6,653
Cloman Land and Sheep Company	64.3 R	12	----------	27	31	13	19	5	3	----------	98	----------	60
Tisdale Irrigation and Drainage Co.	64.45L	12	34	60	80	132	71	172	29	3	581	----------	***568
Emaline Wilson (Fruchtenicht)	64.90R	12	----------	----------	60	22	44	22	12	5	165	----------	120
D. L. W. Hoffman	65.7 L	12	----------	1	106	38	77	43	47	----------	312	----------	103
Tisdale Irrigation and Drg. Co. (Winship Plant)	67.1 L	20	----------	28	81	82	268	53	56	13	581	----------	***
J. L. Browning	69.05R	24	----------	107	120	226	179	52	91	----------	775	----------	300
Faxon Ranch	69.25R	18	----------	69	539	266	112	18	41	----------	1,045	----------	405
Houchins-Hoffman-Beckley and Ritchey	70.45R	20	118	176	182	170	124	108	144	30	1,052	----------	131
Alameda Sugar Company (Grimes)	71.1 L	24	----------	2,100	2,400	2,180	2,260	2,140	1,140	----------	12,220	1,163	1,176
Dale Mumma	71.9 R	12	----------	22	75	88	105	75	13	----------	378	----------	50
Duke Young	73.2 R	12	21	44	39	66	75	39	6	----------	290	----------	115
Alameda Sugar Co. (Headquarters)	74.5 L	20	----------	628	64	489	158	75	15	----------	1,429	----------	460
J. H. Yates	76.1 L	10	----------	----------	66	58	53	45	37	----------	259	----------	40
Dr. E. V. Jacobs	77.9 L	12	98	85	183	61	109	17	14	----------	567	----------	270
C. E. Reische	79 L	10	43	60	58	75	61	48	37	----------	382	----------	320
G. W. Woods	79.7 L	10	----------	19	60	14	17	4	----------	----------	114	----------	30
Alameda Sugar Company (Meridian)	80.0 L	24	----------	----------	1,690	1,730	1,671	1,670	1,070	----------	7,831	590	1,454
F. J. Steidelmeyer and Sons	80.95R	12	----------	17	17	----------	----------	32	24	----------	90	----------	40
J. M. Gomes	83 3 L	12	----------	----------	20	----------	6	23	----------	----------	49	----------	40
P. E. Garmire	83.6 L	10	----------	----------	25	----------	13	----------	8	----------	46	----------	20
Oakland Prune Company	86.1 R	12	----------	110	35	71	25	----------	----------	----------	241	----------	95
J. F. Peck	86.6 L	15	----------	40	153	42	39	78	20	----------	372	----------	110
Lloyd Scoggins	86.8 L	10	35	22	----------	59	34	6	39	2	197	----------	45
Campbell-Dwyer (Lower)	86.9 R	15	----------	185	156	116	92	46	25	----------	620	----------	90
Campbell-Dwyer (Upper)	87.4 R	18	----------	85	35	78	56	60	11	4	329	----------	45
Jacobsen and O'Rourke	87.6 L	10	23	----------	38	60	----------	18	26	6	171	----------	30
Swinford Tract Irrigation Co.	87.7 R	12	82	38	34	94	68	8	2	40	366	----------	145

*Distance along river above Sacramento.
**Diversions estimated from measurements. Power data refused by owner.
***Acreage given for plant at mile 64.45L is the total irrigated from this plant and the Winship plant.

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TABLE 71—Continued

SACRAMENTO RIVER DIVERSIONS—1924

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion, March to October, acre-feet	Acreage irrigated	
			March	April	May	June	July	August	September	October		Rice	General
Jake Locovich	87.7 L	3		0 1	0 8	0 1	0 2	0 7			1 9		2
D. DeJarnett (Mogk and Locovich)	88.2 L	10	3	78		88	58			23	250		70
D. DeJarnett (M. M. Louranee)	88 7 L	14	91		125	122	33	70	32	7	480		105
Colusa Irrigation Company	89.2 R	20	207	250	240	493	350	228	15	58	1,841		1,000
Colusa Delta Farms	89.3 L	20	140	376	1,260	428	760	149	60	49	3,222		1,545
T. H. Boggs and Sisters	89 8 L	12		43	28	22	69	18	6		186		45
Roberts Ditch Company	90.7 R	2-20	149	738	733	1,030	940	775	700	111	5,176	100	1,500
Geo. P. Ahlf	92 5 L	14	148	85	140	45	157	40	25	92	732		70
Geo. P. Ahlf	92 5 L	8		31	44					30	105		65
U. W. Brown	93 0 R	12	56	151	49	37	5				298		80
Tuttle Land Company	94.3 R	20	80	735	211	477	337	202	141	292	2,475		385
A. N. Lewis	95 6 L	16		167	765		238	348		154	1,672		334
I. G. Zumwalt	95 7 R	12		55	28		50			22	155		150
Bridget Graham Estate	95 8 L	15		35	126	20	10	10		15	216		41
I. G. Zumwalt	96 85R	12			96	15		42			153		100
D. P. O'Sullivan	97.7 R	20		248	125	57	68	18	25		541		65
Frank Beckley	98.0 L	6						7	4		11		68
Poirier and Sperry	98 6 L	15		45	12	57					114		57
Wm. and D. Boggs	98 8 L	18		15	81	73	53	49	2		273		130
Cheney Slough Irrigation Co.	99.0 R	2-26, 1-36		1,720	2,610	2,180	2,000	1,740	638		10,888	520	205
Terrill and Sartain	99 2 L	20		142	254	225	184	140	68	29	1,042		680
U. W. Brown, Jr.	99.7 L	12	35	20	42						97		36
W. F. Klewe	100 8 L	20		13	198						211		160
A. F. and R. C. Wohlfrom	101 1 R	20		400	221	88	171	115	27		1,022		130
Maxwell Irrigation District	102 8 R	2-18, 2-30, 1-36		950	2,700	2,970	1,910	1,470	1,770	1,270	13,040	[1]1,466	[1]1,820
Compton-Delevan Irrigation District	103 8 R	2-24, 1-36		1,070	568	277	310	400	157	6	2,788	[1]4,000	[1]100
E. M. Gordon	103 9 R	15							23		23		10
B. F. Gould	104 7 L	20		735	877	402	453	168	246		2,881		500
H. W. Keller	106 0 R	14	218	383	299	263	165	95	143	133	1,699		230
I. N. McVay	108.5 L	12					32	15			47		20
W. A. Yerxa and Son	110 0 R	12					162	102		42	306		166
Reclamation District 1004	112 1 L	1-36, 1-24		738	1,000	187	507	445	3,990	585	7,452		1,700
Princeton-Codora-Glenn Irrigation District	112 4 R	3-24		1,380	3,010	3,790	2,800	752			11,732	[2]864	[2]3,785
A. J. Stone	112 6 L	1-8, 1-6	16	44	54	45	68	67	77		371		140
Morse and Langdon	114 2 R	8	47		69	35	35				186		135
Edward L. Steele	115 5 L	12	113	128	111	111		89	106	16	674		84
Butte City Ranch	115 8 R	8		59	151	151	83	20	45	77	586		[2]415
Butte City Ranch	116 7 R	12		140	140	290	290	290			1,150		(3)
Butte City Ranch	116.7 R	8		50	50	100	100	100			400		(3)
Tom Crouch	119 0 L	10	40	40	68	44	55	51	60		358		70
Bogue-Killebrew and St. Louis	123 8 R	6			30	18	26	7			81		60
Princeton-Codora-Glenn Irrigation District	123 9 R	3-24	1,180	2,740	3,700	3,430	4,980	4,900	3,940	846	25,716		(3)

Provident Irrigation District	124.2 R	1-36, 4-42		3,800	20,900	19,600	20,200	18,200	10,700	784	94,184	7,031	3,925
Mrs. C. L. Leonard	126.3 R	8		37	15	28	14	28	26	19	167		165
Lindo Nursery	130.7 R	3				2	2	2	2		8		2
J. E. Scharsch	130.8 R	1½		0.2	0.2	0.2	0.2	0.2	0.2		1.2		0.25
Martin Jensen	131.5 R	6		5	2						7		7
Parrott-Phelan Estate	141.5 L	5-24		441	1,360	4,110	4,780	5,040	1,940	562	18,233	1,250	911
Merrill Knight	146.7 L	4				4					4		0.5
P. M. Rooney	146.9 L	5				34					34		30
G. F. Alves (Nord Slough)	147.0 L	10			86	152	137	89	31		495		150
G. F. Alves	147.0 L	6					3	3	3		9		
J. L. Gianelli	150.0 L	10		84	129	107	183	141	43		687		100
Sacramento Valley Sugar Co.	151.0 R	1-12, 1-18			63	744	1,000				1,807		850
Glenn-Colusa and Jacinto Irrig. Dists.[4]	154.8 R	3-72, 1-100		28,200	52,000	54,000	53,500	43,300	25,600	5,200	261,800	17,594	25,302
J. M. Wight	166.7 R	3			9	10	6	6	9		40		10
Wm. H. Hall	166.8 R	2		1.4	2.9	2.9	1.5	2.9	1.9	1.2	14.7		5
W. M. Ham	167.2 R	1									0.2		1
R. A. Foster	168.7 R	5				18	32	24	15		89		95
R. A. Foster	169.1 R	8			13	30	26		12	3	84		30
Doyle Ranch	169.8 R	8		67	165	172	188	194	82		868		80
Doyle Ranch	170.7 R	6				11					11		40
Doyle Ranch	171.0 R	6		8	14		16	15			53		100
Doyle Ranch	174.2 R	8		52	81	79	87	79	19		397		90
Noble (J. J. Susa)	184.5 R	14		41	93	115	153	176	145		723		50
Nap Brearcliffe	192.5 R	4				1	2	2	1	1	7		3
S. E. Ayer	194.1 R	3			2	2	2	3	1		10		18
G. E. Sutton	196.2 R	6			3	3	3	4	1		14		20
P. A. Edwards	196.2 L	6			17	17		5			39		43
W. E. Johnson	196.5 L	4				20					20		25
J. Erickson	196.6 L	3		1	1	6	1		1		10		25
H. P. Stice	197.0 L	6				13	20	13	13		59		32
Freemeyer Brothers	197.6 L	3					8	1			9		35
Wm. H. Freemeyer	197.6 L	3					8	1			9		
A. N. Cunningham	209.0 L	2½				5			1		6		6
J. F. Nunas	215.5 R	7			24	24	24	24			96		21
J. F. Nunas	216.0 R	3		4	4	4	4	4	4		24		
W. A. Hunaeus	216.4 L	3			3	2					5		7
J. L. Haskins	218.0 L	4		17	21	20	9			24	91		45
Johnson and Coates	221.0 L	8			81	95	81	70	40		367		460
Harris Bros. (Harris and Dempster)	240.5 L	10		147	216	151	232	183	44		973		140
Michael Leonardini Estate	242.0 L	8			28	40	44	49	49		210		60
Adams Bros.	242.5 R	6			11	82	73	32	26		224		50
Diestelhorst	243.0 R	6		118	75	112	115	117	93	29	659		30
Anderson-Cottonwood Irrigation District	243.0 R			8,930	12,300	15,400	18,100	17,600	17,000	7,680	97,010		[5]19,000
Totals			7,324	102,511	184,043	186,073	189,081	163,677	97,976	22,088	952,773	59,688	104,269

*Distance along river above Sacramento.

[1]This acreage is irrigated from both river and Colusa Trough pumping plants, the greater portion from the Trough. See Colusa Trough diversions.

[2]The acreage given for pump at mile 112.4R is the total served by both pumping plants.

[3]Total acreage irrigated by three pumps is given for pump at mile 115.8R.

[4]The figures given are the totals for both districts. The Jacinto District receives water pumped through the Glenn-Colusa plant. The Jacinto District diversions were as follows: April 1,390; May, 1,940; June, 1,830; July, 2,180; August, 1,730; Sept., 1,280; Oct., 315—Total, 10,665 acre-feet. Acreage irrigated 3,000 general.

[5]Approximate estimate—no data available.

TABLE 72

SACRAMENTO RIVER DIVERSIONS—1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
City of Sacramento	0.20L	3-20, 1-18	1,561	1,831	2,373	2,669	2,551	2,181	1,974	15,140	Municipal	----------
E. Fourness	1.45R	1- 5	No diversion									
G. D. Jones	2.05L	1- 8	----------	----------	148	194	8	----------	----------	350	130	----------
Frank Christophel	2.40L	1- 5	----------	----------	16.9	6	10.6	3.3	----------	36.8	35	----------
H. M. Swalley	2.45L	1- 5	----------	----------	4.1	26.1	9.8	----------	----------	40.0	38	----------
H. E. Sleeper	2.9 L	1- 3	No diversion									
Hayward Reed	3.55R	1-15	----------	----------	216	69	43	----------	----------	328	[1]290	----------
Hayward Reed	3.60R	1-10	----------	----------	34	79.9	68.5	----------	----------	182.4	(1)	----------
W. E. M. Beardslee	3.75R	1- 5	----------	----------	----------	6.1	----------	----------	----------	6.1	10	----------
W. I. Elliott	4.00R	1- 8	----------	----------	27.7	52.8	55.5	----------	----------	136	150	----------
Reese and Greer (Capital National Bank)	4.65R	1- 7	----------	----------	16.1	----------	----------	----------	----------	16.1	12	----------
Harbinson Brothers	5.05R	1-14	----------	84	142	62	30	24	----------	342	Stock and Pasture	
K. I. Lovdal (A. M. Harbinson)	5.25R	1-10	----------	----------	9	20	49.7	53.3	----------	132	70	----------
C. H. Merkeley Estate	5.3 R	1- 8	No diversion									
A. Casselman	5.5 R	1- 5	No diversion									
K. I. Lovdal (Harbinson Brothers)	5.70R	1-10	No diversion									
J. E. Bandy	6.0 R	1- 6	No diversion									
Riverside Mutual Water Co.	6.10L	2-18	----------	----------	595	1,920	1,348	683	25	4,571	1,998	----------
O. A. White	6.40R	1- 6	No diversion									
J. Parkinson	7.50L	1- 8	0.8	4.0	37	43.5	0.4	----------	----------	85.7	100	----------
F. L. Martin and A. B. Carter (F. J. Stahl)	7.80L	1-10	----------	----------	67	61.3	38.7	15	24	206	93	----------
A. Marty	7.90R	1- 8	----------	----------	----------	----------	57	8	2	67	50	----------
M. E. and R. F. Bennett	7.90L	1-10	----------	----------	----------	27.6	35.4	12	----------	75	77	----------
M. Marty	8.30R	1-10	----------	----------	49.5	248.3	177.2	96	----------	571	250	----------
Julius Blauth	8.5 R	1- 5	No diversion									
H. Waldeck	8.70R	1- 6	----------	2	18.3	17.7	10.5	9.5	0.5	58.5	25	----------
T. T. C. Gregory	8.95R	1-15	----------	----------	73.5	121.5	52	----------	14	261	400	----------
Kate Merkeley	9.20R	1- 6	No diversion									
A. A. Merkeley	9.35R	1-16	----------	27	188	157	144	88	24	628	230	----------
R. G. Pearson and P. S. Driver (C. M. Owen and F. C. Jones)	9.80L	1-15	----------	----------	71.4	96.4	160.2	----------	----------	328	384	----------
Geo. B. and Carl Casselman	9.90R	1-12	----------	----------	120.4	78.5	76.1	36	10	321	85	----------
F. W. Kiesel	10.25L	1-15	----------	----------	203	273	212	115	----------	803	570	----------
Reese Estate (Louis Ashwandan)	10.75R	1-12	----------	----------	49.1	49.8	67.1	36.6	38.4	241	80	----------
R. F. Fiddyment and E. G. Cahill	10.75L	1-12	----------	----------	----------	29.3	44.7	----------	----------	74.0	145	----------
H. L. Hill, Jr. (W. R. Taylor)	11.1 R	1-15	----------	----------	45.4	209.3	253.3	----------	72	580	345	----------
Conaway Ranch	12.0 R	4-36	3,460	2,808	3,825	4,249	3,966	856	----------	19,164	460	3,665
E. C. Hauser	13.1 R	1-12	----------	----------	----------	----------	44.2	----------	----------	44.2	20	----------

A. A. Merkeley (California Bank and Trust Co.)	13.25R	1-12			19					19	15	
I. Lowell	13 9 L	1- 5	No diversion									
Elkhorn Mutual Water Company	14.1 L	1-20, 1-26			1,500	1,831	1,488	689		5,508	3,238	
A. A. Merkeley (California Bank and Trust Co.)	15.15R	1- 8	No diversion									
R. H. Mayhood	15.7 L	1- 6			2	54	55			111	30	
Central Mutual Water Company	16.0 L	2-38, 1-22	67	1,782	2,650	3,086	3,089	2,540	711	13,925	1,292	1,086
Manuel Rose	16.4 R	1-10	No diversion									
J. C. Cox and James Beach	16.7 R		No diversion									
A. Linggi	18.45L	1-12					148			148	40	
Natomas Company of California (Goodland Subdivision)	19.6 L	1-30		1,508	2,327	3,005	3,343	3,093	396	13,672		1,836
C. S. Luce (James Beach)	22.5 R	1-18			793	272	218			1,283	220	
Fred Traganza	29.7 R	1- 8				19.9	12.8	12.8		45.5	35	
P. L. Traganza and K. Russell	29.75R	1- 8				16.2		11.2		27.4	20	
A. C. Huston (J. P. West)	31.5 R	1-12		4	47	61		18	16	[1]146	[1]17	
Kendall Ranch	32.0 R	1-10			33.3	39.7	29		19	121	80	
Sutter Mutual Water Company (Portuguese Bend)	32.0 L	2-24		121	1,276	2,093	1,068	360		4,918	440	
Collier Brothers	32.5 R	1-10				5	31	6	8	50	20	
J. G. Knox and Fred Leiser	33.75L	1-12			51	52	27			130	90	
Meek Estate	34.2 R	2-16, 1-12	464	1,253	1,822	2,276	1,661	826		8,302	[1]173	1,200
River Farms Company (Townsite)	34.25R	1-20, 1-24, 1-26		2,183	2,616	2,839	2,947	1,304		11,889	605	1,854
Fred Van Lew	35.2 L	1-12			0.4	6	3.6			10	13	
Dr. J. H. Scott (Kirkman Nursery)	35.6 L	1- 6			13.3	25.8	24.5	19.1		82.7	30	
J. H. Donnelly (A. Marconi)	35.8 L	1-10			13.1	14.1	25.8			53	40	
Amedeo Moroni	36.7 L	1- 5					24			24	40	
Sutter Mutual Water Company (State Ranch Bend)	40.6 L	1-24	83	1,094	2,480	2,086	1,853	1,141		8,737	(4)	
El Dorado Ranch	43.1 R	1-14		63	226	279	307	76		951	575	
River Farms Company (Recl. Dist. 2047 pumps)	43.1 R	2-50	No diversion									
P. J. Hiatt	48.7 L	1-20					387			387	40	
River Farms Company (Tyndall Mound)	51.1 R		No diversion									
G. J. Stam	51.2 L	1-24			151	316	256	214	335	1,272	550	
A. T. Spencer	55.1 L	1-20			194	72	32	260	109	667	612	
River Farms Company (Boyer Bend)	56.4 R	1-18			55	825	235			1,115	637	
J. M. Miller	56.6 R	1-12				44	101			145	50	
River Farms Company (Steiner Bend)	59.4 R		No diversion									
R. A. Lamb (Lamb Brothers)	59.8 L	1-12			33.7	54.4	15.5			103.6	65	
Thomas H. Coulter	60.5 L		No diversion									
Jack Hines	62.3 R	1-10					22.9			22.9	25	
W. M. Baker	62.60R	1- 8				11.8				11.8	17	
Reclamation District 108 (Wilkins Slough)	63.2 R	5-48	907	3,646	4,845	5,551	5,339	3,465		23,753	1,252	1,994
Sutter Mutual Water Company and Improvement Mutual Water Company (Tisdale)	63.75L	6-42	2,380	19,135	34,260	30,054	26,997	20,165	2,555	135,546	[5]15,125	[5]7,162

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Total acreage for both plants, mile 3.55R and 3.60R.

[2] High ditch losses.

[3] Includes 113 acres of alfalfa irrigated for River Farms Company.

[4] See Plant at Mile 63.75L.

[5] This includes acreage irrigated both from this plant and the State Ranch Bend plant, mile 40.6L. It includes also, 1995 acres general crops irrigated by the Improvement Mutual Water Company entirely from the Tisdale plant.

TABLE 72—Continued

SACRAMENTO RIVER DIVERSIONS—1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Cloman Land and Sheep Company	64.3 R	1-12			8.9	15.1			10	34	60	
Tisdale Irrigation and Drainage Company	64.4 L	1-12		11.6	31.8	150.5	50.5	30.6	1	276	[1]825	
Emaline Wilson (Fruchtenicht)	64.90R	1-12	No diversion									
D. I. W. Hoffman	65 7 L	1-12					213.2	90.7	45.1	349	100	
Tisdale Irrigation and Drainage Company (Winship)	67 1 L	1-20			558	297	1,021	595		2,471	([1])	
J. L. Browning	69.0 R	1-24			34	161	133	24	72	424	130	
Faxon Ranch	69.2 R	1-18			110	140	24		60	334	94	
Houchins-Hoffman-Beckley and Ritchey	70 4 R	1-20		395	644	134				1,173	560	
Alameda Sugar Company (Grimes)	71 1 L	1-24		508	555	954	973	400		3,390	[2]5,650	
Steidelmeyer (Dale Mumma)	71.9 R	1-12			103	24	20	30		177	50	
E. E. Vann (Duke Young)	73 2 R	1-12		12						12	14	
Alameda Sugar Company (Headquarters)	74 5 L	1-20		6	744	365	437	36	42	1,630	([3])	
J. H. Yates	76.1 L	1-10			36	9	32			77	35	
Dr. E. V. Jacobs	77.9 L	1-12			1	20		2		23	15	
C. E. Reische	79 0 L	1-10		10	73	70	40	19	3	215	[4]121	
G. W. Woods	79.7 L	1-10		23	23.4	1 2	0.8			48 4	34	
Alameda Sugar Company (Meridian)	80.0 L	1-24, 1-18		85	1,423	2,386	2,135	909	50	6,988	([3])	
F. J. Steidelmeyer and Sons	80.9 R	1-12	No diversion									
J. M. Gomes	83 3 L	1-12	No diversion									
P. E. Garmire	83 6 L	1-10	No diversion									
Oakland Prune Company	86 1 R	1-12			36	23			35	94	95	
J. F. Peck	86.6 L	1-15			88	26	112			226	110	
Lloyd Scoggins	86.8 L	1-10					43			43	53	
Campbell-Dwyer, Lower (F. E. Buffum)	86.9 R	1-15			12	194	47			253	160	
Campbell-Dwyer, Upper (F. E. Buffum)	87.4 R	1-18				99	2			101	85	
Jacolsen and O'Rourke	87.6 L	1-10	No diversion									
Swinford Tract Irrigation Company	87 7 R	1-12			69	57	5		49	180	145	
D. De Jarnett, Lower (Mogk and Locoviteh)	88 2 R	1-10				32		21		53	140	
J. B. DeJarnett, Upper (M. M. Lourance)	88.7 L	1-14			85	81	145	11		322	105	
Colusa Irrigation Company	89.2 R	1-20		94	582	353	350	53	74	1,506	450	
Colusa Delta Farms Company	89.3 L	1-20	No diversion									
T. H. Boggs and Sisters	89.8 L	1-12			4.8	5.2	3			13	45	
Roberts Ditch Company	90 7 R	2-20			925	756	701	254	89	2,725	650	
Geo. P. Ahlf	92 5 L	1-14				144	35			179	90	
Geo. P. Ahlf	92 5 L	1- 8				39.2				39 2	65	
U. W. Brown	93.0 R	1-12	No diversion									

I. G. Zumwalt	93.2 R	1-36, 1-18	No diversion									
Tuttle Land Company	94.3 R	1-15, 1-20	----------	7	163	262	75	33	4	544	550	----------
Jeanette D. Ragain	94.8 R	1-12	No diversion									
F. W. Farnsworth	95.2 L	1-15, 1-20	No diversion									
A. N. Lewis	95.6 L	1-16	No diversion									
I. G. Zumwalt	95.7 R	1-12	----------	----------	----------	----------	----------	----------	73	73	150	----------
Bridget Graham Estate	95.8 L	1-15, 1-20	No diversion									
I. G. Zumwalt	96.8 R	1-12	No diversion									
D. P. O'Sullivan	97.7 R	1-20	----------	----------	46	17	46	----------	----------	109	65	----------
Frank Beckley	98.0 L	1- 6	No diversion									
Poirier and Sperry	98.6 L	1-15	No diversion								[5]40	----------
Wm. and D. Boggs	98.8 L	1-18	----------	----------	55.5	102.8	68.7	----------	----------	227	[6]205	----------
Cheney Slough Irrigation Company	99.0 R	1-36, 2-26	----------	1,331	1,550	1,990	1,568	1,340	152	7,931	290	500
Terrill and Sartain	99.2 L	1-20	No diversion								[6]90	----------
U. W. Brown, Jr. (Byron Weast)	99.8 L	1-12	----------	----------	----------	22	----------	----------	----------	22	36	----------
W. F. Klewe	100.8 L	1-20	No diversion									
A. F. and R. C. Wohlfrom	101.1 R	1-20	----------	3	5	41	4	2	134	189	132	----------
Byron D. Beckwith	101.9 L	1-12	No diversion									
Maxwell Irrigation District	102.8 R	2-18, 2-30, 1-36	----------	1,999	1,220	4,181	809	1,215	----------	9,424	60	[7]1,500
Compton-Delevan Irrigation District	103.8 R	2-24, 1-36	----------	2,263	2,770	3,665	1,243	523	403	10,867	110	[8]2,500
E. M. Gordon	103.9 R	1-15	----------	----------	----------	----------	48.7	40.5	----------	89.2	40	----------
B. F. Gould	104.8 L	1-20	----------	----------	----------	749	277	142	----------	1,168	450	----------
Thousand Acre Ranch (H. W. Keller)	106.0 R	1-14	----------	----------	119	117	96	----------	62	394	230	----------
I. N. McVay	108.5 L	1-12	----------	----------	----------	39.2	----------	----------	----------	39 2	20	----------
W. A. Yerxa and Sons	110.0 R	1-12	----------	----------	155.7	63.3	57.6	----------	----------	276.6	166	----------
Reclamation District 1004	112.1 L	----------	----------	802	5,270	5,711	5,444	5,228	----------	22,455	----------	2,500
Princeton-Codora-Glenn Irrigation District	112.4 R	3-24	----------	2,241	2,925	3,010	3,269	879	----------	12,324	[9]3,086	[9]1,761
A. J. Stone	112.6 L	1- 8	No diversion									
Edward L. Steel (W. L. King)	115.5 L	1-12	----------	----------	98	34	71	7	71	281	84	----------
Butte City Ranch	115.8 L	1- 8	----------	----------	----------	----------	43	----------	----------	43	[10]411	----------
Butte City Ranch	116.7 R	1-12	----------	----------	----------	52	82	----------	----------	134	([10])	----------
Butte City Ranch	117.8 R	1- 6	----------	----------	----------	48.3	----------	----------	----------	48.3	([10])	----------
Tom Crouch	119.0 L	1-10	----------	----------	68.5	25.6	----------	----------	----------	94.1	70	----------
Bogue-Killebrew and St. Louis	123.8 R	1- 6	No diversion									
Princeton-Codora-Glenn Irrigation District	123.9 R	3-24	1,370	5,950	5,807	6,133	6,085	5,613	926	31,884	([11])	([11])
Provident Irrigation District	124.2 R	4-42, 1-36	----------	14,985	20,188	21,273	19,430	16,184	2,037	94,097	380	8,160

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Acreage given for plant at mile 64.4L is the total irrigated from this plant and the Winship plant, mile 67.1L.

[2] This is the total acreage irrigated from the three plants, mile 71.1L, 74.5L and 80.0L.

[3] See plant at mile 71.1L.

[4] Includes acreages irrigated from this plant for adjacent landowners as follows: Kilgore 30, Rockholt 14, Stacs 15.

[5] Irrigated from Wm. and D. Boggs plant, mile 98.8L.

[6] Includes 40 acres orchard irrigated for Sperry and 90 acres alfalfa irrigated for Terrill and Sartain.

[7] This is the total acreage irrigated from both this plant and the Colusa Trough plant. (See Colusa Trough Diversions.)

[8] This is the total acreage irrigated from this plant and the Colusa Trough Plant. (See Colusa Trough Diversions.) For this acreage, also, the district received 8,126 acre-feet during the season from the Glenn-Colusa Irrigation District. (See diversions, mile 154.8R.)

[9] The acreage given for plant at mile 112.4R is the total served by both pumping plants. (See, also, mile 123.9R.)

[10] Total acreage irrigated by three Butte City Ranch plants is given for plant at mile 115.8L.

[11] See plant at mile 112.4R.

TABLE 72—Continued

SACRAMENTO RIVER DIVERSIONS—1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
C. I. Leonard	126.3 R	1-12	----------	----------	37.3	98.2	115.5	24 0	----------	275	1,165	----------
Lindo Nursery	130.7 R	1- 3	No diversion									
J. E. Scharsch	130.8 R	1- 1½	No diversion									
Martin Jensen	131.5 R	1- 6	No diversion									
Parrott-Phelan Estate	141.5 L	5-24	----------	----------	870	4,744	4,380	3,315	----------	13,309	560	1,500
Merrill Knight	146.7 L	1- 4	No diversion									
P. M. Rooney	146.9 L	1- 5	----------	----------	18.3	27.7	----------	----------	----------	46	[3]30	----------
P. M. Rooney	146.9 L	1- 4	----------	----------	13	21	----------	----------	----------	34	(1)	----------
J. I. Gianella (Gianella Heirs Company)	150.0 L	1-10	----------	----------	73	62	59	----------	----------	194	160	----------
Manuel Miguel Company	Opposite 150 0 L**	1-10	----------	----------	36	30	58	----------	----------	124	100	----------
Sacramento Valley Sugar Company	151.0 R	1-18, 1-12	----------	----------	----------	19.2	206.9	362.9	----------	589	Industrial	
Glenn-Colusa, Jacinto, Compton-Delevan Irrigation Districts[2]	154.8 R	3-72, 1-108, 1-56 1-45, 2-40	***	***8,105	***53,543	63,480	62,090	37,741	2,834	227,793	[3]11,133	20,807
J. M. Wight	166.7 R	1- 3	----------	----------	----------	4	12	10	3	29	10	----------
Wm. H. Hall	166 8 R	1- 2	----------	----------	----------	2.5	4.1	2.6	1.5	10.7	5	----------
W. M. Ham	167.2 R	1- 1	----------	----------	1.1	0.7	1.1	----------	----------	2.9	10	----------
R. A. Foster	168.7 R	1- 5	No diversion									
R. A. Foster	169.1 R	1- 8	----------	----------	----------	----------	39	58	----------	97	30	----------
Doyle Ranch	169.8 R	1- 6	No diversion									
Doyle Ranch	170.7 R	1- 6	No diversion									
Doyle Ranch	171.0 R	1- 6	No diversion									
Doyle Ranch	174.2 R	1- 8	----------	----------	15.4	73.7	59.9	----------	----------	149	90	----------
Tehama Ranch	177.8 R	1- 6	No diversion									
Tehama Ranch	178.1 R	1- 6	No diversion									
Tehama Ranch	178.3 R	1-10	No diversion									
Noble (J. J. Susa)	184.5 R	1-14	----------	----------	----------	54.9	36.9	35 2	----------	127	50	----------
Nap Breareliffe	192.5 R	1- 4	----------	----------	----------	3.6	3	----------	----------	6.6	5	----------
S. E. Ayer	194.1 R	1- 3	----------	----------	----------	1.4	1.8	----------	----------	3.2	14	----------
G. E. Sitton	196.2 R	1- 6	----------	0.8	1.4	4.6	0.4	----------	----------	7.2	20	----------
P. A. Edwards	196.2 L	1- 6	----------	12	12	----------	4	----------	----------	28	30	----------
W. E. Johnson	196.5 L	1- 4	----------	----------	----------	3.1	----------	----------	----------	3 1	25	----------
J. Erickson	196.6 L	1- 3	1 2	1 2	6.2	0.7	----------	1.2	----------	10.5	25	----------
H. P. Stice	197.0 L	1- 6	----------	----------	7.7	15.2	----------	----------	----------	22.9	32	----------
W. H. Freemeyer	197.6 L	1- 3	----------	----------	0.9	2.4	----------	----------	----------	3.3	[3]35	----------
Freemeyer Brothers	197.6 L	1- 3	No diversion								(4)	----------
A. N. Cunningham	209.0 L	1-2½	----------	----------		----------	----------	1	----------	6	6	----------

J. F. Nunas (Lower)	215.5 R	1- 7				15.2	14.4			29.6	[5]23	
J. F. Nunas (Upper)	216.0 R	1- 3			2.5	1.6	1.6	1.6		7.3	([5])	
W. A. Hunaeus	216.4 L	1- 3	No diversion									
J. L. Haskins	218.0 L	1- 4				7.2	3.6			10.8	45	
Johnson and Coates	221.0 L	1-10		91	236	83	227	140		777	350	
Harris Brothers (Harris and Dempster)	240.5 L	1-10		18	123	127	20		8	296	130	
M. Leonardini Estate	242.0 L	1- 8				94	96	38		228	60	
Adams Brothers	242.5 R	1- 6			42.6	103.4	24.8	14.2	6	191	70	
Diestelhorst	243.0 R	1- 6			24	79	84	31		218	30	
Anderson-Cottonwood Irrigation District[6]	243.0 R	Gravity	883	13,210	18,758	22,800	22,853	20,568	4,530	[6]103,602	15,000	
Totals			11,177	87,709	184,151	211,788	194,888	134,442	18,108	842,263	76,222	58,025

* Mileage along river above Southern Pacific bridge, Sacramento.

** Pump on Nord Slough, or Pine Creek Lagoon which joins Sacramento River at mile 147.0L. Plant is located three miles up slough on right bank or opposite mile 150.0L, Sacramento River.

*** Additional gravity diversions by Glenn-Colusa Irrigation District from Stony Creek as follows: April 11th to 31st, 5,069 acre-feet; May 1st to 31st, 19,572 acre-feet; June 1st to 9th, 1,534 acre-feet.

[1] Total irrigated by both pumps at mile 146.9L.

[2] Water for Glenn-Colusa Irrigation District and Jacinto Irrigation District and portion of water for Compton-Delevan Irrigation District is all diverted at this pumping plant. The diversion figures given are the totals for this plant. The water for Jacinto Irrigation District was delivered to it from the Glenn-Colusa Irrigation District Canal as follows: May, 481 acre-feet; June, 1,657 acre-feet; July, 1,891 acre-feet; August, 1,769 acre-feet; September 734 acre-feet; October 440 acre-feet. The water for Compton-Delevan Irrigation District was delivered to Funks Creek from the Glenn-Colusa Irrigation District canal at a point in the NE ¼ section 18, T. 17 N., R. 3 W., as follows: June, 1,675 acre-feet; July, 1,462 acre-feet; August, 3,381 acre-feet; September, 1,608 acre-feet. (See mile 103.8R for Compton-Delevan Irrigation District main river diversion.)

[3] Total acreage for Jacinto and Glenn-Colusa Irrigation districts. The Jacinto Irrigation District irrigated 2,500 acres general crops and no rice. (See mile 103.8R for Compton-Delevan Irrigation District acreage.)

[4] Area served by both pumps at mile 197.6L.

[5] Irrigated from both pumps, mile 215.5R and 216.0R.

[6] At times, especially toward the latter part of the season, a considerable portion of the water from this diversion is spilled back, unused, to the creek channels between Redding and south of Cottonwood. These channels return the water to the Sacramento River. An estimate (from observation of these channels at various times during the season) of this return water (including seepage to the channels) for the 1925 season gives the following: (Acre-feet) May, 2,000; June, 3,000; July, 6,000; August, 3,000; September, 13,000; October, 2,000; total 34,000 acre-feet.

TABLE 73

SACRAMENTO RIVER DIVERSIONS—1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
City of Sacramento	[1]0.8 L	3-20, 1-18	1,921	2,204	2,609	2,662	2,504	2,173	1,738	15,811	Municipal	
E. Fourness	1.45R	1- 8	----------	8	22	----------	----------	14	----------	44	45	----------
G. D. Jones	2.05L	1- 8	----------	2	45	30	8	----------	----------	85	60	----------
Frank Christophel	2.40L	1- 5	----------	----------	0.3	28.5	12.5	5.4	----------	46.7	34	----------
H. M. Swalley	2.45L	1- 5	----------	3	6	4	3	----------	----------	16	15	----------
Albert Elkus[2]	2.9 L	1- 5	----------	----------	----------	----------	7	6	----------	13	5	----------
Hayward Reed	3.55R	1-15	----------	48	114	47	115	15	4	343	[3]290	----------
Hayward Reed	3.60R	1-10	----------	40	133	104	171	14	----------	462	(4)	----------
W. E. M. Beardslee	3.75R	1- 5	No diversion									
W. I. Elliot	4.00R	1- 8	20	20	19	71	32	21	----------	183	135	----------
Reese and Greer (Spreckels Sugar Co.)	4.65R	1- 7	22	66	116	9	----------	----------	----------	[5]213	260	----------
Harbinson Bros. (Geo. Harbinson)	5.05R	1-14	----------	265	87	182	----------	20	----------	[6]554	[6]134	----------
R. S. Seydel[7]	5.25R	1- 8	----------	----------	----------	60	----------	----------	----------	60	40	----------
C. H. Merkeley Estate (Merkeley Bros.)	5.3 R	1- 8	----------	----------	9	5	----------	----------	----------	14	60	----------
A. Casselman	5.5 R	1- 5	----------	----------	----------	13	----------	----------	----------	13	18	----------
K. L. Lovdal	5.7 R	1-10	No diversion									
J. E. Bandy	6.0 R	1-6, 1-2	No diversion									
Riverside Mutual Water Co.	6.10L	2-18	----------	167	1,456	1,252	877	217	----------	3,969	1,869	----------
O. A. White	6.40R	1- 6	No diversion									
J. B. Parkinson	7.50L	1- 8	----------	----------	9	26	29	----------	----------	64	100	----------
F. L. Martin and A. B. Carter (F. J. Stahl)	7.8 L	1-10	14	45	----------	20	5	----------	----------	84	35	----------
A. Marty	7.90R	1- 8	----------	----------	----------	49	48	8	----------	105	50	----------
M. E. and R. F. Bennett	7.90L	1-10	----------	----------	24	31	44	----------	----------	99	89	----------
M. Marty	8.3 R	1-10	----------	----------	157	278	224	168	----------	827	250	----------
Julius Blauth	8.5 R	1- 5	No diversion									
H. Waldeck	8.70R	1- 6	----------	----------	16	7	7	7	----------	37	30	----------
T. T. C. Gregory	8.95R	1-18	----------	----------	43	247	256	----------	----------	546	700	----------
Kate Merkeley	9.20R	1- 6	No diversion									
Sousa-Santos Company[8]	9.35R	1-14	----------	----------	77	168	53	94	14	406	252	----------
R. G. Pearson and P. S. Driver (C. M. Owen and F. C. Jones)	9.80L	1-14	----------	----------	68	195	81	118	----------	462	[9]167	----------
Geo. and Carl Casselman	9.9 R	1-12	----------	45	108	121	20	38	----------	332	130	----------
F. W. Kiesel	10.25L	1-14	154	----------	48	392	383	69	----------	1,046	574	----------
Reese Estate (Louis Ashwandan)	10.75R	1-12	----------	23	159	154	33	104	----------	473	88	----------
R. F. Fiddyment and E. J. Cahill	10.75L	1-12	----------	----------	32	25	21	33	----------	111	95	----------
H. L. Hill, Jr. (W. R. Taylor)	11.1 R	1-14	No diversion									
Conaway Ranch	12.0 R	4-36	731	3,245	8,229	8,440	7,175	1,365	----------	29,185	780	5,000
Julius Hauser Ranch[10]	13.1 R	1-12	----------	74	174	128	94	106	8	584	112	----------

California Bank and Trust Co.[11]	13 25R	1-12	No diversion									
Elkhorn Mutual Water Co.	14.1 L	1-24, 1-20		184	1,721	2,143	1,404	673		6,125	2,112	
M. F. Merkeley[12]	15 15R	1-18					84			84	40	
R. H. Mayhood	15 7 L	1- 6			14	8	17	7		46	40	
Central Mutual Water Co.[13]	16.0 L	2-38, 1-22	1,089	2,569	4,218	4,313	3,286	495		[13]15,970	1,590	2,035
Ellis Jones and J. K. Brown	16.3 R	1-10	No diversion									
Thomas J. Cox Estate[14]	16.7 R	1-16	No diversion									
Frank Fisher and Henry Rich	17.75R	1-15			287					287	296	
A. Linggi	18.45L	1-12			43	118	40			201	70	
Northern Mutual Water Company[15] (Booster at mouth of Cross Canal)	19.6 L	1-36		884	2,839	2,810	3,242	1,283		[16]11,058	[16]35	[16]1,990
Frank Fisher and Henry Rich[17]	22.5 R	1-20, 1-15, 1-12		581	1,049	1,509	1,396	692		5,227	281	637
Butte Farms Land Co.[18]	26.95R	1-18				321	624	389		1,334		[18]350
Fred Traganza	29.7 R	1- 8			27	3	27	20	21	98	35	
P. L. Traganza and K. Russell	29.75R	1- 8			7	14	9	15		45	33	
Laura Freitas	29.9 L	1-12			11		10	1		22	55	
Leo Giovanetti	30.2 L	1- 3		1.1	1.2	1.2	1.2	1.2	1.1	7.0	[19]5	
Charles Ghiselli	30.45L	1- 2	1	1	1	1	2	6	2	14	[19]5	
Wm. Dreher (J. G. Goulart)	30.75L	1- 8						30		30	[19]10	
A. G. Huston (J. P. West)	31.5 R	1-12		29	40	24	13	7		113	80	

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Note correction in mileage as given heretofore.

[2] New plant installed at practically same location as plant listed under H. E. Sleeper in 1925. The latter was used for irrigation of Sleeper lands in 1925. New pump in 1926 used for irrigation of Elkus lands.

[3] Total acreage for both plants, mile 3.55R and 3.60R.

[4] See mile 3.55R.

[5] Additional water was received in May and June via Harbinson plant. (See mile 5.05R.)

[6] 20 acre-feet were diverted in September exclusively for stock watering. This is included in total diversion. In May and June some of the water diverted at this plant was used on Reese and Greer lands to the south. (See mile 4.65R.)

[7] Listed heretofore as K. L. Lovdal (A. M. Harbinson) mile 5.25R.

[8] Listed heretofore as A. A. Merkeley.

[9] Driver 114 acres and Pearson 53 acres.

[10] Listed heretofore as E. C. Hauser plant.

[11] Listed heretofore as A. A. Merkeley (California Bank and Trust Co.).

[12] Listed heretofore as A. A. Merkeley (California Bank and Trust Co.) mile 15.15R.

[13] This plant pumps to the irrigation canal both water from the Sacramento River and water which returns to the plant through a large drain of R.D.1000. The diversions listed are those from the river only. Additional water pumped from the drain was as follows: (Acre-feet) April, 230; May, 496; June, 480; July, 498; August, 1,106; September, 1,100; total 3,910.

[14] Listed heretofore as J. C. Cox and James Beach.

[15] Listed heretofore as Natomas Company of California (Goodland subdivision). Cross Canal, the main drain between reclamation districts 1000 and 1001 joins the river at mile 19.6L. At the mouth of this drain Natomas Northern Mutual Water Company maintains, during the irrigation season, a booster pump supplying water from river to drain. The water is retained in the drain by a movable dam at its mouth. There are pumping plants along the south bank of Cross Canal at mile 1.0 and 4.0 from the mouth to repump to the Northern Mutual Water Co. lands south of the canal. The plant at mile 1.0 is not connected and has not been operated in 1924, 1925 or 1926.

[16] The acreage shown was irrigated from the Cross Canal plant at mile 4.0. This plant, in turn, received the greater portion of its water through the booster at the mouth of the canal. The booster diversions are given in this Table. The water pumped at the plant at mile 4.0 was as follows: (Acre-feet) April, 124; May, 3,252; June, 3,166; July, 3,483; August, 3,425; September, 1,478. The excess of these diversions over those for the booster is probably due to continual repumping of water returned to the canal above the dam, and early in the season, due to natural run-off entering Cross Canal from Auburn Ravine as well as to a supply of water in the canal as "storage."

[17] Location of plant heretofore listed as C. S. Luce. The Luce plant was removed after the 1925 season.

[18] This water pumped from river into Grays Bend to supply additional water needed for irrigation of 350 acres of rice grown by Butte Farms Land Co. on Hershey Estate lands. Balance of water used on this area came from storage in Grays Bend (old river channel which receives flood water only).

[19] Estimated.

TABLE 73—Continued

SACRAMENTO RIVER DIVERSIONS—1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Kendall Ranch	32.0 R	1-10	----------	19	40	17	15	21	----------	112	96	----------
Sutter Mutual Water Co. (Portuguese Bend)	32.0 L	2-24	766	2,586	2,647	2,934	2,658	857	----------	12,448	1,119	550
Collier Brothers	32.5 R	1-10	----------	----------	----------	14	16	14	----------	44	20	----------
J. G. Knox and Fred Loiser	33.75L	1-12	----------	11	52	15	55	----------	----------	133	64	----------
Meek Estate	34.2 R	2-16, 1-10	70	1,032	1,788	1,826	1,915	581	----------	7,212	[11]113	825
River Farms Co. (Townsite Plant)	34.25R	1-24, 1-26, 1-20	----------	373	2,421	652	940	78	----------	4,464	[12]1,453	----------
Fred Van Lew	35.2 L	1-12	----------	----------	8	----------	6	----------	----------	14	13	----------
Dr. J. H. Scott	55.6 L	1- 7	----------	----------	48	8	15	----------	----------	71	30	----------
J. H. Donnelly (A. Morconi)	35.8 L	1-10	----------	62	61	29	----------	6	----------	158	93	----------
Amedeo Moroni	36.7 L	1- 5	----------	----------	15	1	----------	----------	----------	16	40	----------
River Farms Co.[9] (Garden pump)	36.95R	1- 2	0.3	1.3	0.8	1.3	0.6	0.4	----------	4.7	2	----------
L. W. Bundock	37.75L	1- 8	----------	26	53	----------	----------	----------	----------	79	86	----------
McCutcheon Ranch (M. Cogno and A. Colli)	39.4 L	1-12	----------	----------	6	19	7	----------	----------	32	35	----------
Sutter Mutual Water Co. (State Ranch Bend)	40.6 L	1-24	527	1,583	2,041	1,921	2,141	593	----------	8,806	([6])	----------
El Dorado Ranch	43.1 R	1-14	31	146	440	367	374	158	----------	1,516	575	----------
P. J. Hiatt	48.7 L	1-20	----------	929	970	911	822	236	----------	3,868	50	200
River Farms Co. (Tyndall Mound Plant)	51.10R	----------	No diversion									
G. J. Stam	51.2 L	1-24	----------	492	771	981	813	318	----------	3,375	338	160
Spencer Ranch Co.	55.1 L	1-20	----------	65	189	65	54	----------	----------	373	790	----------
Reclamation District 108[8] (Boyer Bend Plant)	56.4 R	1-18, 1-30	----------	1,937	2,953	2,665	2,989	952	----------	11,496	[6]722	596
J. M. Miller[7]	56.65R	1-12	No diversion									
R. A. Lamb (Lamb Brothers)	59.8 L	1-12	----------	6	66	68	20	----------	----------	160	100	----------
Reclamation District 108[8] (Steiner Bend Plant)	[9]59.85R	1-14, 1-16	----------	1,284	1,375	1,777	1,721	1,282	----------	7,439	----------	863
Thomas J. Coulter	60.5 L	1-12	----------	----------	8	16	----------	----------	----------	24	21	----------
Hines Ranch[10]	62.3 R	1-10	----------	----------	----------	5	9	4	----------	18	15	----------
Wm. Baker	62.60R	1- 8	----------	----------	10.2	4.2	----------	----------	----------	14.4	8	----------
Reclamation District 108 (Wilkins Slough Plant)	63.2 R	5-42	2,824	5,909	11,843	11,215	10,307	3,425	----------	45,523	120	4,904
Sutter Mutual Water Co. (Tisdale) and Improvement Mutual Water Co.	63.75L	6-42	6,614	22,203	27,022	26,488	23,024	6,873	----------	112,224	[11]9,957	[11]7,447
Cloman Land and Sheep Co.	64.3 R	1-12	51	----------	10	----------	9	----------	----------	70	20	----------
Tisdale Irrigation and Drainage Co.	64.4 L	1-12	67	41	134	229	110	23	----------	604	[11]1,038	----------
Emaline Wilson (Fruehtenicht)	64.90R	1-12	----------	----------	No diversion							
Otto Wackerman	65.1 R	1-10	----------	----------	24	17	9	8	----------	58	46	----------
D. L. W. Hoffman	65.7 L	1-12	----------	----------	----------	----------	119	----------	----------	119	111	----------
Tisdale Irrigation and Drainage Co. (Winship)	67.1 L	1-20	----------	20	589	1,340	987	174	----------	3,110	([13])	----------
Alameda Sugar Co. No. 5	68.81L	1-12	----------	48	290	376	347	60	----------	1,121	([14])	----------
J. L. Browning	69.0 R	1-24	----------	----------	308	117	94	92	----------	611	250	----------
Faxon Ranch	69.2 R	1-18	----------	----------	220	37	86	28	----------	371	244	----------

Houchins-Hoffman-Beckley and Ritchie (J. M. Ritchie)	70.4 R	1-20	No diversion									
Alameda Sugar Co. No. 4 (Grimes)	71.1 L	1-24	----------	40	1,560	2,472	1,600	307	----------	5,979	[14]	
F. J. Steidelmeyer (Dale Mumma)	71.9 R	1-12	----------	----------	----------	109	48	----------	----------	157	75	----------
E. E. Vann (Duke Young)	73.2 R	1-12	No diversion									
Alameda Sugar Co. (Headquarters No. 3)	74.5 L	1-20	55	69	228	402	180	15	----------	949	[14]	
J. H. Yates	76.1 L	1-12	----------	----------	48	48	37	----------	2	135	62	----------
Dr. E. V. Jacobs	77.9 L	1-12	No diversion									
C. E. Reische[15]	79.0 L	1-10	----------	18	80	46	45	8	----------	[15]197	[15]116	----------
G. W. Woods[16]	79.7 L	1-10	----------	----------	41	34	12	3	----------	[16]90	[16]75	----------
Alameda Sugar Co. (Meridian)	80.0 L	1-18, 1-24	----------	200	1,557	3,022	1,846	392	----------	7,017	[17]4,621	----------
F. J. Steidelmeyer and Sons	80.9 R	1-12	----------	----------	3	60	74	----------	----------	137	47	----------
Geo. W. Kirkpatrick[18]	83.3 L	1-14	----------	----------	----------	64	----------	----------	----------	64	75	----------
P. E. Garmire	83.6 L	1-10	No diversion									
Oakland Prune Co.	86.1 R	1-12	----------	----------	100	----------	----------	----------	29	129	100	----------
J. F. Peck	86.6 L	1-15	----------	----------	80	134	25	----------	----------	239	60	----------
Lloyd Scoggins	86.8 L	1-10	----------	----------	51	28	23	----------	----------	102	50	----------
Campbell-Dwyer (Lower)	86.9 R	1-18	----------	22	41	44	----------	6	----------	113	71	----------
Campbell-Dwyer (Upper)	87.4 R	1-15	----------	----------	78	78	74	----------	----------	230	70	----------
Jacobsen and O'Rourke	87.6 L	1-10	No diversion									
Swinford Tract Irrigation Co.	87.7 R	1-12	----------	25	58	6	6	----------	53	148	140	----------
J. B. De Jarnett (Havener, Nagle and Locovitch)	88.2 L	1-10	----------	----------	22	----------	----------	----------	----------	22	60	----------
J. B. De Jarnett	88.7 L	1-14	----------	----------	100	308	71	----------	----------	479	[19]460	----------
Colusa Irrigation Co.	89.2 R	1-20	----------	90	495	394	209	65	88	1,341	866	----------
Colusa Delta Farms Co.	89.3 L	1-20	No diversion								[20]	

* Mileage along river above Southern Pacific Bridge, Sacramento.

[1] 113 acres alfalfa of River Farms Co. irrigated from Meek Estate system.

[2] An additional area of 113 acres (general) of River Farms Co. was irrigated from Meek Estate pump. (See Mile 34.2R.)

[3] This plant operated to about the same extent in 1924 and 1925 but has not been reported previously.

[4] See Mile 63.75L.

[5] Listed heretofore as River Farms Co. (Boyer Bend).

[6] Includes 55 acres irrigated for J. M. Miller. (See Mile 56.65R.)

[7] Received water from Boyer Bend Plant of River Farms Co. in 1926.

[8] Listed heretofore as River Farms Co. (Steiner Bend).

[9] Heretofore erroneously listed as Mile 59.4R.

[10] Listed heretofore as Jack Hines.

[11] This includes acreages irrigated both from this plant and the State Ranch Bend plant, Mile 40.6 Left. It includes also 1,593 acres general crops irrigated by the Improvement Mutual Water Company (in Recl. Dist. 1660) entirely from the Tisdale Plant.

[12] This is the total acreage irrigated from this plant and the Winship Plant, Mile 67.1 Left. It includes 90 acres of the Eliza Smith lands irrigated from the Winship Plant. It should be noted that this 90 acres on the Smith lands was similarly irrigated in 1925 but this acreage was omitted in giving the total acreage irrigated from the Tisdale Irrigation and Drainage plants in the 1925 report.

[13] See plant at Mile 64.4L.

[14] See plant at Mile 80.0L.

[15] Water diverted at this plant is also used on adjacent lands of Rockholt, Kilgore and Staes. The diversion and acreage figures given are for total area under this plant.

[16] Water diverted at this plant is also used on adjacent lands of Van Mill and Summy. The diversion and acreage figures given are for total area under this plant.

[17] This is total acreage served from all Alameda Sugar Co. plants at Miles 68.81L, 71.1L, 74.5L, and 80.0L.

[18] Listed heretofore as J. M. Gomes plant.

[19] Includes 160 acres of Colusa Delta Farms Lands irrigated from this pump. (See Mile 89.3L.)

[20] Colusa Delta Farms Co. lands may be irrigated from Sacramento River plant at Mile 89.3L, through Reclamation District 1004 canals leading from plant at Mile 112.1L and from Butte Creek diversion. (Colusa Delta Farms Co. lands are included in Reclamation District 1004 but plant at Mile 89.3L is not operated by the district.) Colusa Delta Farms Co. lands irrigated from other plants in 1926 were as follows: 160 general from DeJarnett plant (see Mile 88.7L), 105 general and 797 rice from Reclamation District 1004 plant (see Mile 112.1L) and 179 general from Butte Creek (see Butte Creek diversions).

TABLE 73—Continued

SACRAMENTO RIVER DIVERSIONS—1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
T. H. Boggs and Sisters	89.8 L	1-12	----------	----------	22	26	6	6	----------	60	25	----------
Roberts Ditch Co.	90.7 R	2-20	56	440	844	772	532	410	33	3,087	900	----------
Geo. P. Ahlf	92.5 L	1-14	----------	----------	----------	124	19	8	39	190	155	----------
Geo. P. Ahlf	92.5 L	1- 8	No diversion									
U. W. Brown	93.0 R	1-12	No diversion									
I. G. Zumwalt	93.2 R	1-36, 1-18	No diversion									
Tuttle Land Co.	94.3 R	1-15, 1-20	----------	57	687	308	33	33	8	1,126	460	----------
W. E. Pinney[1]	94.8 R	1-12	----------	----------	27	22	----------	----------	----------	49	80	----------
F. W. Farnsworth (K and S Farms Co.)	95.2 L	1-14, 1-20	15	627	1,138	1,246	1,278	804	----------	5,108	300	400
A. N. Lewis[2] (M. E. Boedefeld)	95.6 L	1-16	----------	----------	231	690	566	----------	----------	[3]1,487	[3]100	----------
I. G. Zumwalt	95.7 R	1-12	----------	----------	----------	74	----------	----------	108	182	100	----------
Bridget Graham Estate (K. Kohama)	95.8 L	1-20, 1-15	305	1,558	1,377	764	743	453	----------	[4]5,200	45	[4]711
I. G. Zumwalt	96.8 R	1-12	No diversion									
D. P. O'Sullivan	97.7 R	1-20	No diversion									
Frank Beckley	98.0 L	1- 6	No diversion									
J. L. Eriscy	98.3 R	1-10	----------	----------	1	----------	----------	----------	31	32	20	----------
Poirier and Sperry	98.6 L	1-15	No diversion									
Wm. and D. Boggs	98.8 L	1-18	----------	----------	----------	40	36	20	18	114	200	----------
Cheney Slough Co.	99.0 R	1-36, 2-26	----------	6,870	7,855	7,550	6,785	2,392	22	31,474	350	3,920
Terrill and Sartain	99.2 L	1-20	----------	763	1,272	1,278	1,178	115	77	4,683	160	520
Dave George[5] (J. M. Westlund)	99.8 L	1-12	No diversion									
W. F. Klewe	100.8 L	1-20	No diversion									
A. F. and R. C. Wohlfrom	101.1 R	1-20	8	30	235	113	9	----------	163	558	147	----------
Byron D. Beckwith	101.9 L	1-12	No diversion									
Maxwell Irrigation District	102.8 R	2-18, 2-30	----------	3,477	2,664	1,729	1,130	576	1,376	10,952	[4]10	[6]1,609
Compton Delevan Irrigation District	103.8 R	2-24, 1-36	----------	209	771	801	790	----------	----------	[7]2,571	[7]683	----------
E. M. Gordon	103.9 R	1-16, 1-20	10	381	660	640	650	98	----------	2,439	59	491
B. F. Gould	104.8 L	1-20	----------	----------	336	432	308	80	562	1,718	498	----------
Thousand Acre Ranch (H. W. Keller)	106.0 R	1-14	----------	87	92	79	----------	46	7	311	196	----------
I. N. McVay[8]	108.5 L	1-12	No diversion									
St. Johns Park Co.[9] (W. A. Yerxa and Sons)	110.0 R	1-12	----------	82	84	89	174	----------	23	452	166	----------
Reclamation District 1004	112.1 L	1-24, 1-30, 1-60	1,800	7,253	9,420	9,548	9,006	2,663	1,298	40,988	[10]105	[10]3,772
Princeton-Codora-Glenn Irrigation District	112.4 R	3-24	142	5,278	5,739	5,575	3,586	166	----------	20,486	[11]2,698	[11]2,694
A. J. Stone[12] (Falkner and Stone)	112.6 R	1-8	No diversion									
Edward L. Steel (W. L. King)	115.5 L	1-12	----------	85	19	74	39	59	----------	276	77	----------
Butte City Ranch	115.8 L	1- 8	No diversion									
Anthony Rademacher	116.1 L	1-2½	----------	----------	0.7	----------	----------	----------	----------	0.7	0.5	----------
Butte City Ranch	116.7 R	1-12	No diversion									

Butte City Ranch	117.8 R	1- 6	No diversion									
Tom Crouch	119.0 L	1-10	----------	----------	29	20	18	18	9	94	70	----------
Staats, Klewe and Killebrew[13]	123.8 R	1- 6	----------	----------	----------	----------	----------	12	----------	12	25	----------
Princeton-Codora-Glenn Irrigation District	123.9 R	3-24	2,335	4,604	4,878	4,991	4,969	3,397	907	26,081	([14])	----------
Provident Irrigation District	124.2 R	4-42, 1-36	4,460	21,689	25,134	22,611	18,674	7,889	548	101,005	66	[15]8,792
California Joint Stock Land Bank (Shellooe)	124.4 R	1-16	----------	----------	170	214	184	209	62	839	280	----------
C. L. Leonard	126.3 R	1-12	----------	37	23	79	30	28	40	237	145	----------
Anna Kern	126.5 R	1-1½	----------	0.10	0.10	----------	----------	----------	----------	0.20	1	----------
J. E. Scharsch	130.8 R	1-1½	No diversion									
Martin Jensen	131.5 R	1- 6	No diversion									
Parrott-Phelan Estate	141.5 L	5-24	----------	----------	1,801	3,806	4,346	1,720	68	11,741	[16]926	[16]1,278
Merrill Knight	146.7 L	1- 3	----------	----------	1.66	1.21	0.34	----------	----------	3.21	3	----------
P. M. Rooney	146.9 L	1-5	----------	----------	23	10	----------	----------	----------	33	25	----------
Gianella Heirs Co.[17]	150.0 L	1-10	----------	----------	72	55	40	----------	----------	167	100	----------
Manuel Miguel Co. (G. F. Alves)	Opposite [18]150.0 L	1-10	No diversion									
Sacramento Valley Sugar Co.	151.0 R	1-12, 1-18	----------	----------	156	93	141	15	----------	405	220	----------

* Mileage along river above Southern Pacific bridge, Sacramento.

[1] Listed heretofore as Jeanette D. Ragain.

[2] Through error no diversion was shown for this plant in the 1925 report. The record for 1925 should have shown that 526 acre-feet were diverted in August for the irrigation of 300 acres general crops.

[3] This plant was operated to supply water to rice on the Graham Estate in addition to the 100 acres of orchard on the Lewis Estate. The diversion to the 100 acres amounted to 231 acre-feet in June. The remaining diversion of 1256 acre-feet was for Graham Estate (see Mile 95.8L).

[4] Additional water was supplied for the rice from the A. N. Lewis pump (see Mile 95.6L). The diversion from this source amounted to 1,256 acre-feet as follows: July 690, August 566.

[5] Listed heretofore as U. W. Brown, Jr., plant.

[6] These acreage figures include 234 rice and 10 general irrigated on the Packer Tract. Of the 1,609 acres of rice, 955 acres were irrigated both from the River plant and the Colusa Trough plant. (See Colusa Trough diversions).

[7] The diversions here listed were those from the River plant of the district which was operated by the Mercantile Trust Company for the irrigation of 683 acres of the "Compton Ranch." The district received water through the Glenn-Colusa Irrigation District plant for 3,994 acres of rice and 60 acres gun club. (See plant at Mile 154.8R.)

[8] No diversion from Sacramento River in 1926. Diverted water from a lake filled from river during flood season.

[9] Listed heretofore as W. A. Yerxa and Sons.

[10] The rice acreage here given, includes 797 acres of rice on Colusa Delta Farms Company lands. It includes also, an area of 1,525 acres outside the district boundaries on the north but which was served from the district canal. This area comprised lands of McVay, Kerr, Houx, Williams, Jacobson and Reichel. The general crop area of 105 acres comprised lands of the Colusa Delta Farms Company irrigated by drainage from rice areas in the district. (Colusa Delta Farms Co. lands are included in Recl. Dist. 1004.) 160 acres of Colusa Delta Farms Co. lands (general crops) were irrigated from DeJarnett upper plant (see Mile 88.7L) and 179 acres (general crops) from Butte Creek (see Butte Creek diversions).

[11] The acreage here given is the total for both district pumping plants. (See also Mile 123.9R).

[12] In 1926 pumping from lake filled from river at flood season.

[13] Listed heretofore as Bogue, Killebrew and St. Louis.

[14] See plant at Mile 112.4R.

[15] Includes 100 acres rice irrigated from Glenn-Colusa Irrigation District canals.

[16] Segregation of irrigated areas as follows: Phelan Estate, 846 general and 420 rice; Parrott Investment Co., 80 general, 858 rice.

[17] Listed heretofore as J. L. Gianella.

[18] Pump on Nord Slough or Pine Creek Lagoon which joins Sacramento River at Mile 147.0L. Plant is located 3 miles up slough on right bank or opposite Mile 150.0L, Sacramento River.

TABLE 73—Continued

SACRAMENTO RIVER DIVERSIONS—1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Glenn-Colusa, Jacinto and Compton-Delevan Irrigation Districts[1]	154.8 R	2-30, 3-42, 4-72, 1-108	3,600	76,512	87,461	85,577	76,612	36,625	15,552	[1]381,939	[2]11,137	[2]37,757
J. M. Wight	166.7 R	1- 3	----------	2	3	6	5	3	1	20	[2]10	----------
Wm. H. Hall	166.8 R	1- 2	----------	0.05	1.12	0.86	0.52	0.81	0.04	3.40	4	----------
H. L. Gurnea	167.4 R	1- 4	----------	1.0	1.4	1.6	1.4	0.5	----------	5.9	[2]20	----------
R. A. Foster	168.7 R	1- 5	No diversion									
R. A. Foster	169.1 R	1- 8	----------	----------	46	38	44	50	----------	178	150	----------
Finnell Land Co. (Doyle Ranch)	169.8 R	1- 8	No diversion									
Finnell Land Co.	170.7 R	1- 6	No diversion									
Finnell Land Co.	171.0 R	1- 6	No diversion									
Finnell Land Co.	174.2 R	1- 8	No diversion									
Tehama Ranch	177.8 R	----------	No diversion									
Tehama Ranch	178.1 R	----------	No diversion									
Tehama Ranch	178.3 R	----------	No diversion									
E. B. Noble (J. J. Silva)	184.5 R	1-14	----------	----------	40	51	66	39	----------	196	90	----------
T. K. Brearcliffe[4]	192.5 R	1- 4	2	2	2	2	2	2	2	14	2.5	----------
S. E. Ayer	194.1 R	[5]1- 6	----------	6	34	36	13	----------	----------	89	72	----------
G. E. Sutton	196.2 R	1- 6	1	3	2	6	----------	1	----------	13	10	----------
Pearl Edwards	196.2 L	1- 6	----------	----------	1	27	9	----------	----------	37	30	----------
A. W. Gibson (T. A. Crook)	196.4 L	1- 6	----------	----------	10	14	10	3	3	40	14	----------
W. E. Johnson	196.5 L	1- 4	----------	----------	9	10	----------	----------	----------	19	27	----------
J. Erickson	196.6 L	1- 3	----------	----------	5.3	0.8	----------	0.6	----------	6.7	27	----------
H. P. Stice	197.0 L	1- 8	----------	----------	43	70	40	41	----------	194	70	----------
G. W. Freemeyer	197.6 L	1- 4	----------	----------	1.5	1.5	1.5	----------	----------	4.5	10	----------
W. H. Freemeyer	197.65L	1- 3	----------	----------	2.8	3.7	----------	----------	----------	6.5	35	----------
G. W. Freemeyer (Pearl Edwards)	197.73L	1- 3	----------	----------	----------	4.7	----------	----------	----------	4.7	10	----------
Bank of Tehama County[6] (J. W. Griffin)	206.0 L	1- 6	----------	----------	10	14	7	----------	----------	31	53	----------
A. N. Cunningham	209.0 L	1- 2½	----------	----------	5.0	----------	----------	1.0	----------	[7]6.0	6	----------
J. F. Nunas (Lower)	215.5 R	1- 7	----------	----------	----------	48	17	12	----------	77	30	----------
J. F. Nunas (Upper)	216.0 R	1- 3	No diversion									
W. A. Hunacus	216.4 L	1- 3	----------	----------	1.1	3.5	----------	----------	----------	4.6	8	----------
J. L. Haskins	218.0 L	1- 4	----------	----------	----------	19	8	8	----------	35	45	----------
Johnson and Coates	221.0 L	1-12	----------	----------	181	79	----------	84	24	368	400	----------

Smith and George	233.0 L	1- 6, 1- 4	----------	11.9	12.6	5.4	5.4	3.4	----------	38.7	26	----------
Wm. Menzel Meat Co.	240.2 L	1-12	----------	34	17	79	116	15	----------	261	[6]65	----------
Harris Bros. (Harris and Dempster)	240.5 L	1-10	----------	8	182	137	123	53	----------	503	[3]115	----------
M. Leonardini Estate	242.0 L	1- 8	3	8	82	37	21	15	----------	166	62	----------
Adams Bros.	242.5 R	1- 6	17	20	85	62	19	20	----------	223	50	----------
John Diestelhorst	243.0 R	1- 6	42	91	117	88	72	90	----------	500	30	----------
Anderson-Cottonwood Irrigation District[8]	243.0 R	Gravity	6,573	15,084	19,807	22,122	18,141	15,554	7,279	104,560	[9]19,000	----------
Totals	----------	----------	34,326	195,052	258,889	259,777	226,874	98,632	30,220	1,103,770	76,625	87,501

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Water for Glenn-Colusa Irrigation District, Jacinto Irrigation District and Compton-Delevan Irrigation District is all diverted at this pumping plant. The diversion figures given are the totals for this plant. The water for Jacinto Irrigation District was delivered to it from the Glenn-Colusa Irrigation District canal as follows: (In acre-feet) April, 0; May, 1,043; June, 1,847; July, 1960; August, 1,335; September, 1,075; October, 413. The water for Compton-Delevan Irrigation District was delivered to Funks Creek from the Glenn-Colusa Irrigation District canal at a point in the NE¼ Section 18, T. 17 N., R. 3 W., as follows: (Acre-feet) April, 0; May, 5,076; June, 4,378; July, 4,530; August, 5,187; September, 982; October, 0. See Mile 103.8R for diversion from river plant of Compton-Delevan Irrigation District used by Mercantile Trust Co. for lands on the "Compton Ranch." There were additional diversions at the Glenn-Colusa plant in March and November as follows: (Acre-feet) March Glenn-Colusa I.D., 545; November, Glenn-Colusa I.D., 10,146, Jacinto I.D., 204.

[2] These figures include Jacinto and Compton-Delevan Irrigation District areas irrigated through the Glenn-Colusa plant as follows: Jacinto I.D., 3203, general crops; Compton-Delevan I.D., 3,994 rice and 60 acres gun club. 100 acres of rice in the Provident Irrigation District was irrigated from Glenn-Colusa system but this is not included in acreage figures given; See Mile 124.2R for Provident diversions and acreages. See Mile 103.8R for areas irrigated from Compton-Delevan river plant.

[3] Estimated.

[4] Listed heretofore as Nap Brearcliffe.

[5] Former 3 in. pump replaced by 6 in.

[6] This plant was not listed in 1925 report but information obtained in 1926 is to the effect that it was operated in 1925, diverting approximately twice the amount of water as given in 1926.

[7] Operation record not kept. Diversion estimated same as 1925.

[8] There is a considerable amount of water from this diversion which is returned to the Sacramento River through the Creek channels between Redding and south of Cottonwood. An estimate (from observation of these channels at various times during the season) of this return water (including seepage to the channels) for the 1926 season gives the following: (Acre-feet) May, 2,890; June, 2,980; July, 2,770; August, 3,070; September, 3,690; October, 1,290; total, 16,690 acre-feet.

[9] Estimate of District Manager that 60 per cent of total area of district was irrigated.

TABLE 74

SACRAMENTO RIVER DIVERSIONS—1927

Water user	Mile and bank	Number and size of pump	Monthly diversions in acre feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
City of Sacramento	0.8 L	3-20, 1-18	1,966	2,430	2,595	3,026	2,952	2,582	2,349	17,900	Municipal	
E. Fourness	1.45R	1- 8			4	7	27	44	17	99	81	
C. W. Jones[1]	2.05L	1- 8			13	44				57	60	
Frank Christophel	2.40L	1- 5			11.1	9.9	2.5	5.8		29.3	34	
H. M. Swalley	2.45L	1-20			6.9	2.9	7.8			17.6	15	
Albert Elkus	2.9 L	1- 5				2.4				2.4	8	
Hayward Reed	3.55R	[2]1-16			246	228	187	45		706	290	
Hayward Reed[3]	3.60R		No diversion									
W. E. M. Beardslee	3.75R	1- 5	No diversion									
W. I. Elliott	4.00R	1- 8			29	8	67			104	130	
Reese and Greer (Spreckels Sugar Co.)	4.65R	1- 7	2	51	70	59	21			[4]203	275	
Harbinson Bros. (Geo. Harbinson)	5.05R	1-14		213	243	6	46	24	3	[5]535	[5]80	
R. S. Seydel	5.25R	1- 8		5	69	65				139	77	
C. H. Merkeley Estate (Merkeley Bros.)	5.3 R	1- 8	No diversion									
A. Casselman	5.5 R	1- 5		7						7	18	
K. L. Lovdal	5.70R	1-10	No diversion									
J. E. Bandy	6.0 R	1- 6, 1- 2	No diversion									
Riverside Mutual Water Co.	6.10L	2-18		118	1,108	1,330	929	156		3,641	1,473	
O. A. White	6.40R	1- 6	No diversion									
California National Bank[6]	7.50L	1- 8	No diversion									
F. L. Martin and A. B. Carter (F. J. Stahl)	7.80L	1-10			50	9				59	40	
A. Marty	7.90R	1- 8				47	28	10		85	[7]400	
M. E. and R. F. Bennett	7.90L	1-10			3	29	58			90	89	
M. Marty	8.3CR	1-10			110	254	248	186	27	825	([8])	
Julius Blauth	8.5 R	1- 5	No diversion									
H. Waldeck	8.70R	1- 6		2.3	11.5	15.0	5.4	3.3		37.5	30	
T. T. C. Gregory	8.95R	1-18		98	249	228	188	6		769	780	
Kate Merkeley	9.15R	1- 2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	Domestic	
Kate Merkeley	9.20R	1- 6				4.2				4.2	20	
A. A. Sousa[9]	9.35R	1-14			97	163	60	187	29	536	280	
R. G. Pearson and P. S. Driver (C. M. Owen and F. C. Jones)	9.80L	1-14			39	151	116			306	[10]103	
Carl Casselman[11]	9.90R	1-12		33	54	47	45	29	13	221	130	
F. W. Kiesel	10.25L	1-14			95	259	531	146		1,031	427	
Reese Estate (Louis Ashwandan)	10.75R	1-12			72	108	26	119	20	345	88	
R. F. Fiddyment and E. J. Cahill	10.75L	1-12			32	70	30	11		143	95	
H. L. Hill, Jr. (W. R. Taylor)	11.10R	1-14	No diversion									
Conaway Ranch	12.0 R	4-36	23	3,368	3,437	4,539	3,242	686		15,295	888	2,037
Julius Hauser Ranch	13.1 R	1-12			188	174	141	118	10	631	112	
California Bank and Trust Co.	13.25R	1-12	No diversion									

Elkhorn Mutual Water Co.	14.1 L	1-24, 1-20	----------	285	1,610	1,819	1,750	567	----------	6,031	2,699	----------
M. F. Merkeley	15.15R	[12]1- 8	----------	----------	----------	10.3	1.2	----------	----------	11.5	15	----------
Sam White[13]	15.7 L	1- 6	----------	----------	----------	27	10	17	10	64	40	----------
Central Mutual Water Co.[14]	16.0 L	2-38, 1-22	1,260	3,056	3,471	3,749	3,252	1,762	55	[14]16,605	1,116	1,694
Frank Fisher and Henry Rich (Hershey Plant)	16.27R	1-20	----------	247	977	950	926	886	444	4,430	180	445
Ellis Jones and J. K. Brown	16.3 R	1-10	No diversion									
H. T. Silvius[15]	16.4 R	1- 6	No diversion									
Thos. J. Cox Estate	16.7 R	1-16	No diversion								([16])	----------
Frank Fisher and Henry Rich (Mull Plant)	17.75R	1-15	----------	----------	271	501	400	109	----------	[18]1,281	([17]) 113	---------- 40
A. Linggi	18.45L	1-12	----------	----------	39	97	32	54	----------	222	75	----------
Frank Fisher and Henry Rich (Hoover Plant)	18.95R	1-18	----------	----------	113	604	711	697	40	[20]2,165	[19]190	80
Northern Mutual Water Co.[21]	19.6 L	1-36	----------	700	1,100	2,958	3,052	2,444	325	[21]10,579	----------	[21]1,630
J. H. Berghauser	21.7 R	1-15, 1-12	----------	137	683	439	559	394	203	[20]2,415	----------	215
Frank Fisher and Henry Rich (Keller Plant)	22.5 R	[22]1-22	----------	953	1,936	1,861	1,926	1,478	88	8,242	[23]183	1,350
Hershey Estate[24]	26.95R	1-18	----------	----------	216	388	130	----------	----------	[24]734	----------	[24]350
Fred Traganza	29.7 R	1- 8	----------	9.3	11.5	17.7	5.3	----------	0.3	44.1	35	----------

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Formerly G. D. Jones.

[2] Former plant replaced by new installation.

[3] Plant dismantled.

[4] Additional water, estimated at 300 acre-feet, was received in May and June via Harbinson plant. (See mile 5.05R.)

[5] Diversions after July 1st were for stock watering only. In May and June approximately 300 acre-feet of diversions here shown for those months was used on Reese and Greer lands to the south. (See Mile 4.65R.)

[6] Formerly J. B. Parkinson.

[7] This is the total acreage irrigated from this plant and the plant at mile 8.3R.

[8] See plant at Mile 7.9R.

[9] Formerly Sousa-Santos Company.

[10] Driver 43 and Pearson 60.

[11] Formerly Geo. and Carl Casselman.

[12] Listed erroneously in 1926 report as 18 in. pump.

[13] Formerly R. H. Mayhood.

[14] This plant pumps to the irrigation canal both water from the Sacramento River and water which returns to the plant through a large drain of R.D. 1000. The diversions listed are those from the river only. Additional water pumped from the drain was as follows: (Acre-feet) July, 710; August, 1,147; September, 1,437; October, 120; total 3,414.

[15] New installation 1927—Not operated up to November 1st.

[16] 35 acres irrigated from Fisher and Rich plant. (See Mile 22.5R).

[17] 113 acres irrigated from Fisher and Rich plant. (See Mile 22.5R).

[18] Some of this diversion was used on rice to the west under the "Keller" plant. (See Mile 22.5R).

[19] 190 acres flooded once and abandoned.

[20] Low duty probably due to high seepage losses.

[21] The diversions here given are those from Sacramento River to Cross Canal, the main drain between R.D. 1000 and 1001, which joins the river at Mile 19.6L. At the mouth of this drain Natomas Northern Mutual Water Co. maintains, during the irrigation season, a booster pump supplying water from river to drain. The water is retained in the drain by a movable dam at its mouth. There are pumping plants along the south bank of Cross Canal at Mile 1.0 and 4.0 from the mouth to repump to the Northern Mutual Water Co. lands south of the canal. Only the plant at Mile 4.0 was operated in 1927 and the acreage shown was irrigated from this plant. In May and most of June, river water was available through Cross Canal without pumping at its mouth. The pumped diversions to Cross Canal were as follows: (Acre-feet) June, 233; July, 2,958; August, 3,052; September, 2,444; October, 325; total 9,012. The water pumped through the plant at Mile 4.0 on Cross Canal was as follows: (Acre-feet) May, 2,075; June, 2,249; July, 3,759; August, 3,825; September, 2,737; October, 520; total 15,165. The excess of water pumped here over that supplied to Cross Canal from the river was probably derived from return drainage to the canal, and natural drainage entering in the earlier part of the season.

[22] New plant installed 1927.

[23] Acreage irrigated from this plant for other parties as follows: H. T. Silvius 35 acres, Manuel Rose 35 acres and Thos. J. Cox Estate 113 acres.

[24] Listed previously as Butte Farms Land Co. This water pumped from river into Grays Bend to supply additional water needed for irrigation of 350 acres of rice. Balance of water used on this area came from flood water storage in Grays Bend (Old River channel) and water pumped by R.D. 730—No. 1 plant into Grays Bend.

TABLE 74—Continued

SACRAMENTO RIVER DIVERSIONS—1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
P. L. Traganza and K. Russell	29.75R	1- 8	----------	6	18	8	----------	----------	7	39	30	----------
Laura Freitas	29.9 L	1-12	----------	----------	8	----------	10	1	----------	19	30	----------
Leo Giovanetti	30.2 L	1- 3	----------	4.8	10.6	10.1	2.0	1.0	1.0	[1]29.5	5	[1]10
Charles Ghiselli[2]	30.25L	1- 6	8	57	67	78	101	81	----------	[1]392	12	[1]49
Charles Ghiselli	30.45L	1- 2	----------	----------	1.3	0.9	0.7	1.1	0.3	4.3	8	----------
Kendall Ranch (A. Dick and Sons)[2]	30.6 R	1- 7	----------	----------	7	----------	----------	----------	----------	7	30	----------
Wm. Dreher (J. G. Goulart)	30.75L	1- 8	----------	88	158	152	165	157	----------	[1]720	7	[1]39
A. C. Huston (J. P. West)	31.5 R	1-12	----------	7	5	31	11	14	7	75	38	----------
Kendall Ranch	32.0 R	[1]1-10, 1-18	----------	338	1,116	1,146	602	438	----------	3,640	80	464
Sutter Mutual Water Company (Portuguese Bend)	32.0 L	2-24	94	1,628	1,903	1,530	2,188	890	----------	8,233	997	92
Collier Bros.	32.5 R	1-10	----------	----------	----------	6.0	26.1	12.7	4.7	49.5	22	----------
J. G. Knox and Fred Leiser	33.75L	1-12	----------	----------	50	35	30	14	----------	129	120	----------
Meek Estate	34.2 R	2-16, 1-10	579	2,663	2,314	2,404	2,331	667	----------	10,958	[1]113	1,150
River Farms Company (Townsite Plant)	34.25R	1-24, 1-26, 1-20	----------	1,265	983	1,720	997	478	----------	5,443	[5]1,957	----------
Commercial Investment Co. (R. B. Bailey)[6]	34.85L	1-12	----------	32	63	64	75	----------	----------	234	100	----------
Fred Van Lew	35.2 L	1-12	----------	----------	----------	----------	----------	31	----------	31	13	----------
Dr. J. H. Scott	35.6 L	1- 7	----------	----------	52	23	35	----------	----------	110	30	----------
J. H. Donnelly (A. Marconi)	35.8 L	1-10	----------	2	76	17	----------	5	----------	100	75	----------
Amedeo Moroni	36.7 L	1- 5	No diversion									
River Farms Company (Garden Pump)	36.95R	1- 2	1.0	1.0	0.8	0.9	1.0	0.1	0.8	5.6	2	----------
W. W. Bottimore[6]	37.2 L	1-14, 1- 8	----------	203	421	587	744	650	264	[7]2,869	----------	87
L. W. Bundock	37.75L	1- 8	----------	----------	4	----------	48	----------	----------	52	85	----------
McCutcheon Ranch (A. Colli)	39.4 L	1-12	----------	----------	----------	46	38	----------	----------	84	87	----------
Sutter Mutual Water Co. (State Ranch Bend Plant)	40.6 L	1-24	----------	1,219	2,749	2,790	2,824	1,289	----------	10,871	([8])	([8])
Buell Ranch (M. K. Dean)[9]	41.8 L	1- 4	----------	----------	7.2	6.4	6.4	5.6	----------	25.6	30	----------
El Dorado Ranch	43.1 R	[10]1-18	----------	313	512	578	454	208	----------	2,065	621	----------
River Farms Company (R. D. 2047 Plant)	43.1 R	2-50	No diversion									
John Clauss[2]	47.3 L	1-14	----------	----------	135	----------	----------	----------	----------	135	98	----------
P. J. Hiatt	48.7 L	1-20	----------	----------	216	288	326	----------	----------	830	250	----------
Reclamation Dist. 108[11] (Tyndall Mound Plant)	51.1 R	1-36, 2-24	----------	4,998	7,295	9,618	8,658	7,718	3,094	41,381	----------	2,993
G. J. Stam	51.2 L	[1]1-24, 1-12	----------	1,041	1,580	1,850	1,811	1,437	98	7,817	590	820
J. R. Gailbraith (J. A. Campbell)[12]	55.1 L	1-20	----------	----------	151	128	----------	133	----------	412	336	----------
Reclamation Dist. 108 (Boyer Bend Plant)	56.4 R	1-30, 1-18	508	3,285	3,576	3,344	2,991	2,601	289	16,594	711	1,238
J. M. Miller	56.65R	1-12	No diversion									
J. R. Gailbraith[2] (Judah Boaz Corporation)	56.95L	1-20	----------	798	1,063	1,243	1,261	1,220	203	5,788	75	890
R. A. Lamb (Lamb Bros.)	59.8 L	1-12	----------	----------	56	22	17	----------	----------	95	130	----------
Reclamation District 108 (Steiner Bend Plant)	59.85R	1-16, 1-14	----------	1,347	1,525	1,682	1,768	812	----------	[7]7,134	----------	396
Thos. J. Coulter	60.5 L	1-12	----------	----------	101	26	29	27	----------	183	50	----------

Hines Ranch	62.3 R	1-10				14.6	8.2			22.8	18	
William Baker	62.6 R	1- 8	No diversion									
Reclamation Dist. 108 (Wilkins Slough Plant)	63.2 R	5-42	3,192	8,544	8,106	9,879	9,206	5,243	682	44,852	155	3,910
Sutter Mutual Water Company (Tisdale) and Improvement Mutual Water Company	63.75L	6-42	4,458	28,320	32,409	33,860	31,477	17,582	4,109	152,215	[13]10,191	[13]10,672
Cloman Land and Sheep Co.	64.3 R	1-12		5						5	Stock Water	
Tisdale Irrigation and Drainage Company	64.4 L	1-12		266	494	353	372	327	53	1,865	[14]468	[14]712
Emaline Wilson (Fruchtenicht)	64.90R	([15])	No diversion									
Otto Wackerman	65.1 R	1-10			1	44	20	21	2	88	46	
D. L. W. Hoffman	65.7 L	1-12			42	54	37	34	22	189	111	
Tisdale Irrigation and Drainage Co. (Winship Plant)	67.1 L	1-20		1,610	1,709	1,638	1,549	746		7,252	([16])	([16])
Eliza Smith (O. A. Winship)[2]	67.2 L	1-10	No diversion									
Alameda Sugar Co. No. 6[2]	67.4 L	1-14		33	69	180	75	21		378	129	
Alameda Sugar Co. No. 5	68.81L	1-12		36	327	276	316	37		992	149	
J. L. Browning	69.0 R	1-24		243	174		270		154	841	240	
Faxon Ranch	69.2 R	1-18		123	196	82	82	9	119	611	[17]295	
Wilbur Jensen and Mary Cecil, et al.[18]	70.35R	1-26	No diversion									
Houchins-Hoffman-Beckley and Ritchie (J. M. Ritchie)	70.4 R	1-20	No diversion									
Alameda Sugar Co. No. 4 (Grimes)	71.1 L	1-24	31	316	2,255	2,210	582	156	24	5,574	1,658	
Antone Steidelmeyer[19]	71.9 R	1-12				55	40			95	45	
E. E. Vann (Coffman Bros.)	[20]73.6 R	1-12			16	396	27			439	102	
Alameda Sugar Co. No. 3 (Headquarters)	74.5 L	1-20		147	396	265	357	42	13	1,220	592	

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] Rice acreage under plants of Giovanetti, Ghiselli and Dreher at Miles 30.2L, 30.25L and 30.75L comprised one tract irrigated from the three pumping plants.

[2] New installation 1927.

[3] Additional pump installed 1927.

[4] 113 acres alfalfa of River Farms Company irrigated from Meek Estate System.

[5] An additional area of 113 acres alfalfa of River Farms Company was irrigated from Meek Estate Pump. (See Mile 34.2R.)

[6] New plant, 1927.

[7] Very low duty—excessive seepage losses.

[8] See Mile 63.75L.

[9] Newly installed 1927. Owner states plant was operated in 1924 for 10 days in August.

[10] Former pump replaced by new installation, 1927.

[11] Previously listed as River Farms Co. (Tyndall Mound Plant.)

[12] Listed previously as Spencer Ranch Company.

[13] This includes acreage irrigated both from this plant and the State Ranch Bend plant, Mile 40.6L. It includes also 1,005 general and 270 rice irrigated by Improvement Mutual Water Co. (in reclamation District 1660) entirely from Tisdale plant.

[14] This is the total acreage irrigated from this plant and the Winship plant, Mile 67.1L. It includes 32 acres of the Eliza Smith lands also irrigated from the Winship plant.

[15] Pumping plant dismantled.

[16] See Plant at Mile 64.4L.

[17] Includes 5 acres of J. L. Browning irrigated from Faxon pump.

[18] New installation 1927—No operation up to November 1st.

[19] Listed previously as F. J. Steidelmeyer (Dale Mumma).

[20] Plant moved to new location 0.4 mile upstream from former location.

TABLE 74—Continued

SACRAMENTO RIVER DIVERSIONS—1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
J. H. Yates	76.1 L	1-12	----------	----------	39	42	35	3	----------	119	50	----------
Dr. E. V. Jacots	77.9 L	1-12	No diversion									
Sebia Davis (J. Scheimer and P. Auhn)[1]	78.8 R	1-24	360	878	1,617	1,613	1,722	938	----------	7,068	----------	1,570
C. E. Reische	79.0 L	1-10	----------	43	68	77	52	15	----------	255	[2]116	----------
G. W. Woods	79.7 L	1-10	----------	4	58	23	16	3	----------	104	[3]94	----------
Alameda Sugar Co. Nos. 1 and 2 (Meridian)	80.0 L	1-18, 1-24	----------	807	1,941	2,346	1,325	720	124	7,263	2,468	----------
Geo. P. Ahlf[4]	80.3 R	1- 8	----------	----------	----------	2	62	----------	----------	64	65	----------
F. J. Steidelmeyer and Sons	80.9 R	1-12	----------	----------	----------	63	72	----------	----------	135	43	----------
Geo. W. Kirkpatrick	83.3 L	1-14	----------	14	43	30	----------	----------	----------	87	75	----------
P. E. Garmire	83.6 L	1-10	No diversion									
Oakland Prune Company	86.1 R	1-12	----------	46	----------	----------	----------	----------	----------	46	92	----------
J. F. Peek	86.6 L	1-15	----------	----------	91	31	6	----------	----------	128	[5]90	----------
Lloyd Scoggins	86.8 L	1-10	----------	----------	----------	49	----------	----------	----------	49	50	----------
Campbell-Dwyer (Lower)	86.9 R	1-18	No diversion									
Campbell-Dwyer (Upper)	87.4 R	1-15	No diversion									
Jacobsen and O'Rourke	87.6 L	1-10	No diversion									
Swinford Tract Irrigation Co.	87.7 R	1-12	----------	40	53	6	6	----------	39	144	140	----------
J. B. DeJarnett (Havener, Nagle and Locovitch)	88.2 L	1-10	----------	----------	25	21	----------	----------	----------	46	60	----------
J. B. DeJarnett	88.7 L	1-14	----------	----------	101	53	99	17	18	288	300	----------
Colusa Irrigation Company	89.2 R	1-20	----------	259	242	435	242	206	----------	1,384	785	----------
Colusa Delta Farms (Reclamation Dist. 1004)	89.3 L	1-20	No diversion									
T. H. Boggs and Sisters	89.8 L	1-12	----------	----------	3.8	27.1	8.9	7.7	----------	47.5	25	----------
Roberts Ditch Company	90.7 R	2-20	----------	393	571	609	429	265	56	2,323	600	----------
Geo. P. Ahlf	92.5 L	1-14	----------	----------	42	46	50	16	----------	154	155	----------
Geo. P. Ahlf	92.5 L	1- 8	No diversion									
U. W. Brown	93.0 R	1-12	No diversion									
I. G. Zumwalt	93.2 R	1-36, 1-18	No diversion									
Tuttle Land Company	94.3 R	1-15, 1-20	----------	548	636	1,085	796	418	15	3,498	[6]394	175
W. E. Pinney	94.8 R	1-12	----------	93	6	----------	----------	----------	----------	99	80	----------
F. W. Farnsworth	95.2 L	1-20, 1-14	No diversion									
A. N. Lewis	95.6 L	1-16	No diversion									
I. G. Zumwalt	95.7 R	1-12	----------	----------	74	17	----------	----------	33	124	[7]285	----------
Bridget Graham Estate	95.8 L	1-15, 1-20	----------	----------	43	209	----------	----------	----------	252	33	----------
I. G. Zumwalt	96.8 R	1-12	----------	----------	----------	79	----------	----------	----------	79	([8])	----------
Bolla Bros[9]	97.7 R	1-20	----------	15	12	14	6	7	31	85	20	----------
Frank Beckley	90.0 L	1- 6	----------	----------	----------	----------	8	----------	----------	8	26	----------
J. L. Erisey	98.3 R	1-10	No diversion									
Poirier and Sperry	98.6 L	1-15	No diversion								([10])	
Wm. and D. Boggs	98.8 L	1-18	----------	12	174	198	47	65	----------	496	[11]295	----------

Cheney Slough Irrigation Co.	99.0 R	1-36, 2-26	202	6,706	7,063	6,663	6,276	2,795	27	29,732	260	2,616
Terrill and Sartain	99.2 L	1-20	No diversion								[12]	
Dave George (J. M. Westlund)	99.8 L	1-12	No diversion									
W. F. Klewe	100.8 L	1-20	No diversion									
A. F. and R. C. Wohlfrom	101.1 R	1-20	----------	9	102	198	8	19	----------	336	147	----------
Byron D. Beckwith	101.9 L	1-12	No diversion									
Maxwell Irrigation District	102.8 R	2-18, 2-30, 1-36	240	1,985	1,665	1,606	1,315	1,124	----------	7,944	[13]10	[13]862
American Trust Co.[14]	103.7 R	1-16	----------	47	417	465	273	256	----------	1,458	480	----------
Compton-Delevan Irrigation District	103.8 R	2-24, 1-36	No diversion								[15]	[15]
E. M. Gordon	103.9 R	1-16, 1-20	128	1,107	1,140	958	927	767	6	5,033	----------	480
B. F. Gould	104.8 L	1-20	----------	172	34	274	169	63	----------	[16]712	570	----------
Thousand Acre Ranch (H. W. Keller)	106.0 R	1-14	----------	23	74	49	----------	----------	----------	146	156	----------
I. N. McVay	108.5 L	1-12	No diversion									
St. Johns Park Co. (W. A. Yerxa and Sons)	110.0 R	1-12	----------	22	133	130	127	----------	----------	412	166	----------
Reclamation District 1004	112.1 L	1-24,1-30, 1-60	524	5,330	3,990	4,827	5,042	2,643	371	[17]22,727	15	1,666
Princeton-Codora-Glenn Irrigation District	112.4 R	3-24	747	4,815	4,067	5,381	4,466	407	----------	19,883	[18]2,648	[18]3,311
A. J. Stone	112.6 L	1- 8	No diversion									
Edward L. Steel (W. L. King)	115.5 L	1-12	----------	21	24	18	10	40	32	145	40	----------
Butte City Ranch (Chin Hee Tong)	115.8 R	[19]1-12	----------	----------	13	54	4	----------	----------	71	40	----------
Anthony Rademacher	116.1 L	1-2½	----------	0.5	0.2	0.2	0.5	0.1	----------	1.5	3	----------
Butte City Ranch	116.7 R	1-12	No diversion									
Butte City Ranch	117.8 R	1- 6	No diversion									
Tom Crouch	119.0 L	1-10	----------	----------	20	24	26	15	----------	85	70	----------
Staats, Klewe and Killebrew	123.8 R	1- 6	No diversion									
Princeton-Codora-Glenn Irrigation District	123.9 R	3-24	4,064	6,127	5,683	5,640	5,627	3,934	1,747	32,822	[20]	[20]
Provident Irrigation District	124.2 R	4-42, 1-36	5,223	22,723	21,491	21,449	19,467	8,152	513	99,018	95	[21]8,035

*Mileage along river above Southern Pacific bridge, Sacramento.

[1] New installation 1927 (Previous operation 1920).

[2] Water diverted at this plant is also used on adjacent lands of Rockholt, Kilgore and Stacs. The diversion and acreage figures given are for the total area under this plant.

[3] This includes acreages of adjacent land owners. Segregation as follows: Woods 51, Van Mill 4, Summy 21, and Craig 18.

[4] New installation 1927.

[5] Includes 30 acres irrigated on adjacent lands of Reichel.

[6] Includes 32 acres irrigated for Colusa County Bank NE¼ Section 12 and 22 acres on E. T. Niebling property.

[7] This is combined acreage irrigated from plants at 95.7R and 96.8R.

[8] See plant at Mile 95.7R.

[9] Formerly D. P. O'Sullivan.

[10] 40 acres for Sperry irrigated from Wm. and D. Boggs plant, Mile 98.8L.

[11] Includes 120 acres irrigated for Terrill and Sartain (Mile 99.2L) and 40 acres for Sperry (Mile 98.6L).

[12] 120 acres irrigated from Wm. and D. Boggs plant, Mile 98.8L.

[13] Includes 468 rice and 10 alfalfa on the Packer Tract—additional areas of Maxwell Irrigation District watered from Colusa Trough (Gun Clubs). See Colusa Trough Diversions.

[14] Formerly Mercantile Trust Co.—diversion at Mile 103.8R through plant of Compton-Delevan Irrigation District in 1926—new installation at Mile 103.7R in 1927.

[15] Compton-Delevan Irrigation District received its water through the plant of Glenn-Colusa Irrigation District, Mile 154.8R. Acreage irrigated by Compton-Delevan Irrigation District from this source was 2,737 rice.

[16] In the 1926 report the October diversion at this plant was erroneously reported as 562 acre-feet. This should have been 214 acre-feet, making the 1926 seasonal diversion 1,370 acre-feet.

[17] Up to August 16th some of water diverted was wasted back to drains unused. On August 16th this condition was corrected by Water Supervisor. The monthly diversions with estimated correction for this waste are: (Acre-feet) April, 524; May, 4,930; June, 3,890; July, 4,577; August, 4,692; September, 2,643; October, 371; Total, 21,627.

[18] This is the combined acreage for both district plants, 112.4R and 123.9R. These figures include 365 rice and 10 general, irrigated from the Provident Irrigation District system.

[19] Former 8" pump replaced by 12".

[20] See plant at Mile 112.4R.

[21] Includes 203 acres irrigated from Glenn-Colusa Irrigation District system. In addition to acreage listed, 375 rice and 10 general was irrigated for Princeton-Codora-Glenn Irrigation District (See Mile 112.4R) and 180 acres rice for Glenn-Colusa Irrigation District (See Mile 154.8R).

TABLE 74—Continued

SACRAMENTO RIVER DIVERSIONS—1927

Water user	[1]Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
California Joint Stock Land Bank (Shellooe)	124.4 R	1-16	----------	271	240	296	202	54	----------	1,063	273	----------
C. L. Leonard	126.3 R	1-12	----------	67	35	29	21	26	29	207	145	----------
Anna Kern	126.5 R	1-1½	----------	0.1	0.4	0.2	----------	----------	----------	0.7	1	----------
J. E. Scharsch	130.8 R	1-1½	No diversion									
Martin Jensen	131.5 R	----------	Plant removed									
Parrott-Phelan Estate	141.5 L	5-24	----------	1,316	126	1,831	3,592	3,564	----------	[2]10,429	[2]487	[2]1,496
Merrill Knight	146.7 L	1- 3	----------	----------	0.8	0.2	0.1	----------	----------	1.1	1	----------
P. M. Rooney	146.9 L	1- 5	----------	----------	24	14	----------	----------	----------	38	25	----------
Gianella Heirs Co.	150.0 L	1-10	----------	12	13	48	21	168	44	306	125	----------
Manuel Miguel Co. (G. F. Alves)	[3]150.0 L	1-10	No diversion									
Sacramento Valley Sugar Co.	151.0 R	1-12, 1-18	No diversion									
A. Holecek[4]	152.2 R	1- 6	----------	2.8	----------	4.5	3.3	0.6	----------	11.2	45	----------
Maas Brothers[5]	154.6 R	1- 5	----------	----------	----------	----------	----------	1.7	1.2	2.9	1	----------
Glenn-Colusa, Jacinto and Compton-Delevan Irrigation Districts	154.8 R	2-30, 1-42, 2-50 4-72, 1-100	[6]5,368	[6]70,148	72,686	79,430	75,733	38,667	16,015	[7]358,047	[8]15,919	[8]28,187
J. M. Wight	166.7 R	1- 3	1.2	2.8	3.4	5.6	3.9	3.7	1.6	21.6	10	----------
Wm. H. Hall	166.8 R	1- 2	----------	1.3	2.1	1.7	2.2	2.1	1.2	10.6	4	----------
H. L. Gurnea[9]	167.4 R	1- 4	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
R. A. Foster	168.7 R	1- 5	No diversion									
R. A. Foster	169.1 R	1- 8	No diversion									
Finnell Land Co.	169.8 R	1- 8	No diversion									
Finnell Land Co.	170.7 R	1- 6	----------	----------	----------	10	----------	----------	----------	10	18	----------
Finnell Land Co.	[10]171.2 R	1- 8	----------	----------	----------	9	21	----------	----------	30	25	----------
Finnell Land Co.	174.2 R	1- 8	No diversion									
Tehama Ranch	177.8 R	----------	Plant removed									
Tehama Ranch	178.1 R	----------	Plant removed									
Tehama Ranch	178.3 R	----------	Plant removed									
E. B. Noble (J. J. Silva)	184.5 R	1-14	----------	----------	19	29	36	8	30	122	100	----------
T. K. Brearcliffe	192.5 R	1- 4	No diversion									
S. E. Ayer	194.1 R	1- 6	----------	----------	5	36	24	----------	----------	65	32	----------
G. E. Sutton	196.2 R	1- 6	----------	1.2	4.4	4.3	3.7	----------	----------	13.6	7	----------
W. E. Edwards[11]	196.2 L	1- 6	----------	----------	14	21	----------	----------	----------	35	30	----------
A. W. Gibson (T. A. Crook)	196.4 L	1- 8	----------	5	31	38	22	5	----------	[12]101	20	----------
W. E. Johnson	196.5 L	1- 4	----------	----------	6	15	----------	----------	----------	[12]21	27	----------
J. Erickson	196.6 L	[13]1-3, 1-5	----------	----------	12.2	11.3	----------	----------	----------	23.5	27	----------
H. P. Stice	197.0 L	1- 8	----------	----------	40	55	63	27	11	196	65	----------
G. W. Freemeyer	197.6 L	1- 4	No diversion									
W. H. Freemeyer	197.65L	1- 3	No diversion									

Pearl Edwards[10]	197.73L	[11]1- 6				5.5				5.5	10	
Bank of Tehama County (J. W. Griffin)	206.0 L	1- 6	No diversion									
Hathaway and Wohlf[12]	209.0 L	1-2½	No diversion									
J. F. Nunns	215.5 R	1- 7					49	78	21	148	80	
J. F. Nunns	216.0 R	1- 3	No diversion									
W. A. Humaens	216.4 L	1- 3				2.9	1.3			4.2	3	
J. L. Haskins	218.0 L	1- 4			14.9	16.2			5.3	36.4	30	
Johnson and Coates	221.0 R	[13]1-10		3	58	168	42	2		263	460	
Smith and George	233.0 L	1-6, 1-4			6.4	7.2	3.6			17.2	10	
Wm. Menzel Meat Co.	240.2 L	1-12		71	71	43	103	59		347	75	
Harris Brothers (Harris and Dempster)	240.5 L	1-10			18	26	16	1		61	15	
M. Leonardini Estate (Graf and Graf)	242.0 L	1- 8			60	59	65	31		215	70	
Adams Brothers	242.5 R	1- 6		4.4	11.9	15.1	3.4	1.7	1.0	37.5	50	
John Diestelhorst	243.0 R	[14]1- 5		74	88	110	86	68	40	466	30	
Anderson Cottonwood Irrigation District	243.0 R	Gravity	2,400	12,000	17,300	20,000	19,100	17,800	13,000	[20]101,600	17,000	
Totals			31,327	206,864	234,116	269,018	241,876	139,469	44,993	1,158,663	77,861	79,761

* Mileage along river above Southern Pacific Bridge, Sacramento.

[1] Additional water for some of acreage here shown was received from Butte Creek.

[2] Segregation of irrigated areas as follows: Phelan Estate, 417 general and 346 rice; Parrott Investment Co., 70 general and 1,150 rice.

[3] Pump on Nord Slough or Pine Creek Lagoon which joins Sacramento River at Mile 147.0L Plant is located three miles up slough on right bank or opposite Mile 150.0L, Sacramento River.

[4] New installation, 1927.

[5] Not previously listed but owner states plant was operated in 1926, diverting about nine acre-feet.

[6] In April and May additional water was diverted to the Glenn-Colusa Irrigation District canal by gravity from Stony Creek as follows: April 4th to 30th, 10,700 acre-feet; May 1st to 12th, 850 acre-feet.

[7] Water for Glenn-Colusa, Jacinto and Compton-Delevan Irrigation Districts is all diverted at this pumping plant. The diversion figures given are the totals for this plant. The water for Jacinto Irrigation District was delivered to it from the Glenn-Colusa Irrigation District canal as follows: (Acre-feet) April, 163; May, 1,665; June, 1,724; July, 2,264; August, 1,905; September, 992; October, 800; Total, 9,453. The water for Compton-Delevan Irrigation District was delivered to Funks Creek from the Glenn-Colusa canal at a point in the NE¼ Sec. 18, T 17 N, R 3 W, as follows: (Acre-feet) April, 189; May, 4,897; June, 4,412; July, 3,999; August, 3,855; September, 1,030; October, 200; Total, 19,182. See Mile 103.8R for lower river plant of Compton-Delevan Irrigation District (No diversion, 1927). There was an additional diversion of 1,445 acre-feet in November for the Glenn-Colusa Irrigation District. In April the river was sufficiently high that the diversion for this month was by gravity.

[8] These figures include Jacinto and Compton-Delevan Irrigation District areas irrigated through the Glenn-Colusa plant as follows: Jacinto, 4,088 general crops; Compton-Delevan, 2,737 rice. The figures include also 180 acres rice irrigated for Glenn-Colusa Irrigation District from Provident Irrigation District system, but do not include 203 acres irrigated for Provident Irrigation District from the Glenn-Colusa system (See Mile 124.2R for Provident Irrigation District). Included in the general crop figure is an area of 1,093 acres served by Glenn-Colusa Irrigation District, for filling or freshening duck ponds.

[9] Pump on slough not directly connected with river—should not be listed as river diversion.

[10] New location for plant listed previously at Mile 171.0R.

[11] Formerly Pearl Edwards.

[12] Includes 10 acre-feet diverted for W. E. Johnson (See Mile 196.5L).

[13] 10 acre-feet additional was diverted from Gibson Plant (See Mile 196.4L).

[14] Additional pump installed, 1927.

[15] Formerly G. W. Freemeyer.

[16] 3 in. pump removed in 1926—replaced by 6 in. pump in 1927.

[17] Formerly A. N. Cunningham.

[18] Previously listed as 12 in. pump.

[19] Previously listed as 6 in. pump.

[20] There is a considerable amount of water from this diversion which is returned to the Sacramento River through the Creek channels between Redding and south of Cottonwood. An estimate (from observation of these channels at various times during the season) of this return water (including seepage to the channels) for the 1927 season gives the following: (Acre-feet) May, 4,000; June, 5,060; July, 4,000; August, 4,500; September, 5,500; October, 4,000; Total, 27,000 acre-feet.

TABLE 75

SACRAMENTO RIVER DIVERSIONS—1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
City of Sacramento	0.8 L	3-20, 1-18	2,013	2,667	3,044	3,210	3,051	2,548	2,058	18,591	Municipal	
E. Fourness	1.45R	1- 8	3	14	51	32	28	15	----	143	90	----
C. W. Jones	2.05L	1- 8	----	1	48	13	6	----	----	68	100	----
Frank Christophel	2.40L	1- 5	----	6.9	5.0	8.8	4.1	7.8	----	32.6	34	----
H. M. Swalley	2.45L	1- 5	----	----	12.2	5.4	----	----	----	17.6	38	----
Albert Elkus	2.9 L	1- 5	----	----	17.7	6.1	----	----	----	23.8	18	----
Hayward Reed	3.55R	1-16	----	153	426	30	----	4	----	613	335	----
W. E. M. Beardslee	3.75R	1- 5	----	----	11.4	7.9	----	----	----	19.3	20	----
W. I. Elliott	4.00R	1- 8	----	8	103	72	87	26	----	296	130	----
Reese and Greer	4.65R	1- 7	14	77	119	16	4	10	----	[1]240	275	----
Harbinson Brothers	5.05R	1-14	----	192	236	69	----	----	8	[2]505	90	----
R. S. Seydel	5.25R	1- 8	----	20	68	67	----	----	----	155	138	----
C. H. Merkeley Estate (Merkeley Brothers)	5.3 R	1- 8	----	----	11	----	----	----	----	11	60	----
A. Casselman	5.5 R	1- 5	----	----	14	----	----	----	----	14	34	----
K. L. Lovdal	5.70R	1-10	----	----	89	26	----	----	----	115	112	----
J. E. Bandy	6.0 R	1- 6	----	----	43	46	18	20	15	142	90	----
Riverside Mutual Water Co.	6.10L	2-18	----	338	1,263	1,083	983	148	----	3,815	1,398	----
O. A. White	6.40R	1- 6	No diversion									
California Bank and Trust Co.	7.50L	1- 8	No diversion									
F. L. Martin and A. B. Carter (F. J. Stahl)	7.80L	1-10	----	22	56	8	9	----	----	95	40	----
A. Marty	7.90R	1- 8	----	15	47	37	45	20	15	179	[3]400	----
M. E. and R. F. Bennett	7.90L	1-10	----	----	45	48	96	----	----	189	81	----
M. Marty	8.30R	1-10	----	95	227	183	240	76	19	840	(4)	----
Julius Blauth	8.5 R	1- 5	No diversion									
H. Waldeck (H. Melvin)	8.70R	1- 6	0.2	33.9	31.8	16.9	4.2	5.6	1.5	94.1	40	----
T. T. C. Gregory (Spreckels Sugar Co.)	8.95R	1-18	----	357	298	210	18	----	54	937	749	----
Kate Merkeley	9.15R	1- 2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	Domestic	
Kate Merkeley	9.20R	1- 6	No diversion									
A. A. Sousa	9.35R	1-14	----	122	167	95	152	142	59	737	300	----
R. G. Pearson and P. S. Driver (F. C. Jones and C. M. Owen)	9.80L	1-14	----	----	179	147	87	----	----	413	[5]252	----
Carl Casselman	9.90R	1-12	----	24	47	48	43	47	4	213	125	----
F. W. Kiesel	10.25L	1-14	----	22	250	232	522	85	----	1,111	243	----
Reese Estate (Louis Ashwandan)	10.75R	1-12	----	----	193	82	82	32	----	389	88	----
R. F. Fiddyment and E. J. Cahill	10.75L	1-12	----	----	55	75	43	----	----	173	95	----
H. L. Hill, Jr. (W. R. Taylor)	11.10R	1-14	No diversion									
Conaway Ranch	12.0 R	4-36	1,009	3,188	5,409	4,712	4,347	1,482	----	20,147	155	2,971
Julius Hauser	13.1 R	1-12	----	22	176	53	139	77	----	467	86	----
California Bank and Trust Co.	13.25R	1-12	No diversion									

Elkhorn Mutual Water Co.	14.1 L	1-24, 1-20	----------	484	2,518	1,931	703	560	----------	6,196	2,585	----------
M. F. Merkeley	15.15R	1- 8	No diversion									
Sam White	15.7 L	1- 6	----------	11	28	30	18	9	----------	96	40	----------
Central Mutual Water Co.	16.0 L	2-38, 1-22	1,878	3,270	4,577	4,591	4,481	2,887	----------	[6]21,684	[7]2,121	1,921
Frank Fisher and Henry Rich (Hershey Plant)	16.27R	1-20	----------	381	910	986	955	144	----------	3,376	[8]79	365
Ellis Jones and J. K. Brown	16.3 R	1-10	No diversion								([10])	([9])
H. T. Silvius	16.4 R	1- 6	No diversion									([9])
Thomas J. Cox Estate (Beach and Cox)	16.4 R	1-16	No diversion								([11])	([11])
Frank Fisher and Henry Rich (Mull Plant)	17.75R	[12]1-20	----------	508	892	973	967	----------	----------	3,340	[13]336	[13]330
A. Linggi	18.45L	1-12	----------	----------	136	160	71	101	----------	468	100	----------
Frank Fisher and Henry Rich (Hoover Plant)	18.95R	1-18	----------	112	581	570	548	232	----------	2,043	220	73
Northern Mutual Water Co.	19.6 L	1-36	1,100	3,200	2,563	2,915	3,489	378	----------	[14]13,645	[14]607	[14]1,693
J. H. Berghauser	21.7 R	1-15	No diversion									
Frank Fisher and Henry Rich (Keller Plant)	22.5 R	1-22	----------	1,615	1,954	2,017	1,921	440	----------	7,947	165	[15]1,032
Hershey Estate	26.95R	1-18	No diversion									
Fred Traganza	29.7 R	1- 8	No diversion									
P. L. Traganza and K. Russell	29.75R	1- 8	----------	3	17	15	10	----------	----------	45	29	----------
Laura Freitas	29.9 L	1-12	----------	----------	8	----------	8	----------	----------	16	30	----------
Leo Giovanetti	30.2 L	1- 3	----------	1.5	3.5	3.0	2.6	1.4	1.2	13.2	8	----------
Charles Ghiselli	30.25L	1- 6	No diversion									
Charles Ghiselli	30.45L	1- 2	----------	1.9	2.2	1.7	0.7	0.2	----------	6.7	22	----------
Kendall Ranch (Lower)	30.6 R	1- 7	No diversion									
William Dreher (J. G. Goulart)	30.75L	1- 8	12	167	156	163	82	----------	----------	580	18	38
A. C. Huston (A. Simmons)	31.5 R	1-12	----------	----------	19	20	11	11	----------	61	25	[16]22

* Mileage along river above Southern Pacific Bridge, Sacramento.

[1] Additional water, estimated at 300 acre-feet, was received in May and June via Harbinson Plant (See Mile 5.05R).

[2] In May and June approximately 300 acre-feet of diversions here shown for those months were used on Reese and Greer lands to the south (See Mile 4.65 R).

[3] This is the total acreage irrigated from this plant and the plant at Mile 8.30R.

[4] See plant at Mile 7.90R.

[5] Pearson 137 and Driver 115.

[6] No drainage water pumped to irrigation canal as in 1927.

[7] Includes 170 acres in "East Side Subdivision" but irrigated from "Central" plant.

[8] Includes 26 acres irrigated for Ellis Jones and J. K. Brown (See Mile 16.30R).

[9] See note for Fisher and Rich, Keller Plant, Mile 22.50R.

[10] See note for Fisher and Rich, Hershey Plant, Mile 16.27R.

[11] See notes for Fisher and Rich, Keller and Mull Plants, Mile 22.50R and Mile 17.75R, respectively.

[12] 15 in. pump replaced by 20 in. in 1928.

[13] Includes 154 rice and 76 general irrigated on Thomas J. Cox Estate (See Mile 16.70R).

[14] The diversions here given are those from Sacramento River to Cross Canal, the main drain between R. D. 1000 and 1001 which joins the river at Mile 19.6L. At mouth of this drain Natomas Northern Mutual Water Co. maintains, during the irrigation season, a booster pump supplying water from river to drain. The water is retained in the drain by a movable dam at its mouth. There are pumping plants along the south bank of Cross Canal at Mile 1.0 and 4.0 from the mouth to repump to the Northern Mutual Water Co. lands south of the canal. Only the plant at Mile 4.0 was operated in 1928 and the acreage shown was irrigated from this plant. The rice acreage includes 977 acres in the "East Side Subdivision." In April and most of May, river water was available through Cross Canal without pumping at its mouth. The pumped diversions to Cross Canal were as follows: (Acre-feet) May, 90; June, 2,563; July, 2,915; August, 3,489; September, 378; Total, 9,435. The water pumped through the plant at Mile 4.0 on Cross Canal was as follows: (Acre-feet) April, 1,821; May, 3,840; June, 3,017; July, 3,364; August, 3,475; September, 382; Total, 15,899. The excess of water pumped here over that supplied to Cross Canal from the river was probably derived from return drainage to the canal, and natural drainage entering in the earlier part of the season.

[15] Includes 32, 35, and 300 acres irrigated, respectively, on lands of Jones and Brown (See Mile 16.30R), Silvius (See Mile 16.40R) and Thomas J. Cox Estate (See Mile 16.70R).

[16] Irrigated from Kendall Ranch Plant (See Mile 32.00R).

TABLE 75—Continued

SACRAMENTO RIVER DIVERSIONS—1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Kendall Ranch	32.0 R	1-10, 1-18	----------	1,111	1,704	1,779	1,731	756	----------	7,081	60	[5]550
Sutter Mutual Water Co. (Portuguese Bend)	32.0 L	2-24	317	1,160	1,522	1,629	1,320	225	----------	6,173	([2])	([2])
Collier Brothers	32.5 R	1-10	----------	4.3	4.8	15.7	11.6	11.1	3.2	50.7	30	----------
J. G. Knox and Fred Leiser	33.75L	1-12	----------	33	43	34	17	12	----------	139	126	----------
Meek Estate	34.2 R	2-16, 1-10	624	2,305	2,494	2,526	2,431	759	----------	11,139	15	850
River Farms Co. (Townsite Plant)	34.25R	1-24, 1-26, 1-20	----------	1,440	1,554	517	777	----------	824	5,112	1,637	----------
Commercial Investment Co. (R. B. Bailey)	34.85L	1-12	----------	94	70	53	48	----------	----------	265	135	----------
Fred Van Lew	35.2 L	1-12	----------	----------	----------	27	5	----------	----------	32	6	----------
J. H. Scott	35.6 L	1- 7	----------	15	60	27	22	----------	----------	124	29	----------
J. H. Donnelly (A. Morconi)	35 8 L	1-10	----------	15.1	----------	4.6	4.1	3.4	----------	27.2	28	----------
Amedeo Moroni	36.7 L	1- 5	No diversion									
River Farms Co. (Garden pump)	36.95R	1- 2	4.2	6.1	2.6	1.6	0.9	0.4	----------	15.8	3	----------
W. W. Bottimore	37.2 L	[1]1-14	----------	166	----------	----------	----------	----------	----------	166	86	----------
L. W. Bundock	37.75L	1- 8	----------	----------	----------	23.6	7.0	----------	----------	30.6	88	----------
Sutter Mutual Water Co. (McCutcheon Ranch, A. Colli)[4]	39.4 L	1-12	----------	----------	13.7	15.1	----------	----------	----------	28.8	80	----------
Commercial Investment Co. (Otto Bushaw)[5]	39.8 L	1-10	----------	----------	48.0	28.3	27.7	29.0	----------	133.0	70	----------
Sutter Mutual Water Co. (State Ranch Bend)	40.6 L	1-24	----------	2,763	3,376	3,296	3,234	819	----------	13,488	([2])	([2])
Buell Ranch (M. K. Dean)	41.8 L	1- 4	No diversion								[6]40	----------
Sutter Mutual Water Co. (Bozzi and Pressenda)	42.3 L	1- 8	----------	----------	14.2	29.8	----------	----------	----------	44.0	[7]58	----------
El Dorado Ranch	43.1 R	1-18	----------	379	493	431	390	194	53	1,940	572	----------
River Farms Co. (Recl. District 2047 plant)	43.1 R	2-50	3,550	5,045	6,115	6,585	7,242	927	----------	29,464	----------	2,945
John Clauss	47.3 L	1-14	No diversion									
P. J. Hiatt	48.7 L	1-20	13	17	138	280	----------	----------	----------	448	70	----------
Reclamation District 108 (Tyndall Mound Plant)	51.1 R	1-36, 2-24	No diversion									
G. J. Stam	51.2 L	[1]1-24	412	1,644	1,579	1,639	1,567	574	----------	7,415	520	560
J. R. Gailbraith (J. A. Campbell)	55.1 L	1-20	----------	200	367	145	88	----------	----------	800	[9]1,500	[9]510
Reclamation District 108 (Boyer Bend Plant)	56.4 R	1-18, 1-30	----------	215	447	467	200	183	----------	1,512	717	----------
J. M. Miller	56.65R	1-12	No diversion									
J. R. Gailbraith (J. A. Campbell)	56.95L	1-20	318	903	1,220	1,213	986	532	----------	5,172	([10])	([10])
R. A. Lamb (Lamb Brothers)	59.8 L	1-12	----------	11	52	13	19	5	----------	100	130	----------
Reclamation District 108 (Steiner Bend Plant)	59.85R	1-14, 1-16	No diversion									
Thomas J. Coulter	60.5 L	1-12	----------	----------	102	69	46	----------	----------	217	82	----------
Hines Ranch	62.3 R	1-10	----------	----------	----------	17	10	----------	----------	27	18	----------
William Baker	62.6 R	1- 8	----------	----------	----------	6	----------	4	----------	10	5	----------
Reclamation District 108 (Wilkins Slough Plant)	63.2 R	5-42	7,011	9,547	8,427	7,494	7,205	352	----------	40,036	504	2,945
Sutter Mutual Water Co. (Tisdale) and Improvement Mutual Water Co.	63.75L	6-42	12,600	28,460	33,133	32,438	30,626	8,455	2,416	148,128	[11]13,412	[11]8,902
Cloman Land and Sheep Co.	64.3 R	1-12	----------	14	17	----------	----------	----------	----------	31	[11]5	----------

Tisdale Irrigation and Drainage Co.	64.4 L	1-12		419	613	634	727	324		2,717	[13]500	[13]662
Otto Wackerman	65.1 R	1-10		14	35	10	29	8	17	113	40	
D. L. W. Hoffman	65.7 L	1-12		21	87	91	42	38		279	140	
Tisdale Irrigation and Drainage Co. (Winship Plant)	67.1 L	1-20	534	1,146	1,094	1,104	1,156	389		5,423	([14])	([14])
Eliza Smith	67.2 L	1-10	No diversion									
Meridian Farms Water Co., No 6[15]	67.4 L	1-14		39	85	123	53	15		315	([16])	([16])
Meridian Farms Water Co., No 5[15]	68.81L	1-12		151	320	332	238	140		1,181	([16])	([16])
J L Browning	69.0 R	1-24			425	153	53			631	240	
Faxon Ranch	69.2 R	1-18		185	202	320	130		80	917	415	
Wilbur Jensen and Mary Cecil, et al	70.35R	1-24	No diversion								([17])	
Houchins-Hoffman-Beckley and Ritchie (J. M Ritchie)	70.4 R	1-20			43	180	3			226	[18]183	
Meridian Farms Water Co., No. 4 (Grimes)[15]	71.1 L	1-24			809	1,110	772	297		2,988	([16])	([16])
Anton Steidelmeyer	71.9 R	1-12			62	58	36			156	40	
E E Vann (Coffman Brothers)	73.6 R	1-12		19	109	164	12	61		365	110	
Meridian Farms Water Co., No. 3 (Headquarters)[15]	74.5 L	1-20			559	376	441	184		1,560	([16])	([16])
J. H. Yates	76.1 L	1-12		39	39	19	21			118	60	
E. V. Jacobs	77.9 L	1-12	No diversion									
Sebia Davis	78.8 R	1-24	546	1,413	1,493	1,228	1,208			5,888		1,180
C. E. Reische	79.0 L	1-10	7	18	90	72	35	23		245	[19]133	
G. W. Woods	79.7 L	1-10		7	65	27	18			117	[20]113	
Meridian Farms Water Co. Nos. 1 and 2 (Meridian)[15]	80.0 L	1-24, 1-18		1,012	2,953	2,534	1,875	1,197		9,571	[21]4,690	[21]335
Geo. P. Ahlf	80.3 R	1- 8	No diversion									
F. J. Steidelmeyer and Sons	80.9 R	1-12			59	29	34	19		141	45	

* Mileage along river above Southern Pacific Bridge, Sacramento.

[1] An additional 22 acres of rice on Huston Ranch (See Mile 31.50R) was irrigated from this plant.

[2] See plant at Mile 63.75L.

[3] Additional 8 in. pump used in 1927 was removed.

[4] Listed previously as McCutcheon Ranch.

[5] New installation 1928.

[6] Irrigated from Sutter Mutual Water Co. plant. (See Mile 42.3L.)

[7] 40 acres additional irrigated on Buell Ranch. (See Mile 41.8L.)

[8] Additional 12 in. pump used in 1927 has been removed.

[9] This includes acreage irrigated both from this plant and that at Mile 56.95L.

[10] See plant at Mile 55.1L.

[11] These figures give the total acreage irrigated from the Portuguese Bend, State Ranch Bend and Tisdale Plants at Miles 32.0L, 40.6L, and 63.75L, respectively. They include also 461 rice and 426 general, irrigated by Improvement Mutual Water Co. (in Recl. District 1660) entirely from Tisdale Plant.

[12] Also some stock water.

[13] These figures give the total acreage irrigated from this plant and the Winship Plant, Mile 67.1L. The general crop figures includes 75 acres of the Eliza Smith lands also irrigated from the Winship Plant.

[14] See plant at Mile 64.4L.

[15] Listed previously as Alameda Sugar Co.

[16] See plant at Mile 80.0L.

[17] See note for plant at Mile 70.4R.

[18] Includes 10 acres irrigated for Jensen (See Mile 70.35R).

[19] Includes adjacent lands irrigated from Reische Plant, as follows: Reische 63, Kilgore 30, Rockholt 20, Stacs 20.

[20] Includes adjacent lands irrigated from Woods Plant as follows: Woods 50, Craig 18, Summy 45.

[21] These figures give the total acreage irrigated by Meridian Farms Water Co. from plants at Miles 80.0L, 74.5L, 71.1L, 68.81L and 67.4L.

TABLE 75—Continued

SACRAMENTO RIVER DIVERSIONS—1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Geo. W. Kirkpatrick	83.3 L	1-14	----------	----------	48	13	----------	----------	----------	61	75	----------
P. E. Garmire	83.6 L	1-10	No diversion									
Oakland Prune Co.	86.1 R	1-12	----------	40	----------	----------	----------	----------	----------	40	92	----------
J. F. Peck	86.6 L	[1]1-18	----------	----------	22	113	----------	6	----------	141	[3]129	----------
Lloyd Scoggins	86 8 L	1-10	No diversion									
Campbell-Dwyer (Lower)	86.9 R	[5]1-16	----------	----------	218	----------	65	20	99	402	197	----------
Campbell-Dwyer (Upper)	87.4 R	1-15	No diversion									
Jacobsen and O'Rourke	87.6 L	1-10	No diversion									
Swinford Tract Irrigation Co.	87.7 R	1-12	----------	17	129	13	----------	----------	65	224	140	----------
J. B. DeJarnett (Havener, Nagle and Locoviteh)	88.2 L	1-10	----------	----------	13	37	----------	----------	----------	50	60	----------
J. B. DeJarnett	88.7 L	1-14	----------	14	128	98	63	25	11	339	300	----------
Colusa Irrigation Co.	89.2 R	1-20	----------	355	559	465	112	49	130	1,670	852	----------
Colusa Delta Farms (Recl. District 1064)	89.3 L	1-20	No diversion									
T. H. Boggs and Sisters	89.8 L	1-12	----------	15	9	18	5	4	----------	51	60	----------
Roberts Ditch Co.	90.7 R	2-20	39	444	614	653	460	251	28	2,489	600	----------
Geo. P. Ahlf	92.5 L	1-14	----------	----------	48	87	34	----------	----------	169	155	----------
Geo. P. Ahlf	92.5 L	1- 8	Plant removed									
U. W. Brown	93.0 R	1-12	Plant removed									
I. G. Zumwalt	93.2 R	1-36, 1-18	No diversion									
Tuttle Land Co.	94.3 R	1-15, 1-20	----------	123	431	289	82	53	72	1,050	[4]346	----------
W. E. Pinney	94.8 R	1-12	----------	47	66	26	----------	----------	----------	139	[5]90	----------
F. W. Farnsworth	95.2 L	1-20, 1-14	No diversion									
A. N. Lewis	95.6 L	1-16	No diversion									
I. G. Zumwalt	95.7 R	1-12	----------	----------	161	64	----------	----------	40	265	[4]250	----------
Bridget Graham Estate	95.8 L	[1]1-16, 1-20	----------	----------	289	376	72	101	----------	838	217	----------
I. G. Zumwalt	96.8 R	1-12	----------	----------	----------	135	----------	----------	----------	135	(7)	----------
Bolla Brothers	97.7 R	1-20	3	31	28	19	12	20	----------	113	25	----------
Frank Beckley	98.0 L	1- 6	----------	----------	----------	8.5	----------	----------	----------	8.5	[8]10	----------
J. L. Erisey	98.3 R	1-10	No diversion									
Poirier and Sperry	98.6 L	1-15	No diversion									
Wm. and D. Boggs	98.8 L	1-18	----------	18	83	70	43	15	----------	229	(9)	----------
Cheney Slough Irrigation Co.	99.0 R	1-36, 2-26	No diversion								[10]121	----------
Terrill and Sartain	99.2 L	1-20	----------	5	98	350	144	5	5	607	[11]760	----------
Dave George (J. M. Westlund)	99.8 L	1-12	No diversion									
W. F. Klewe	100.8 L	1-20	No diversion									
A. F. and R. C. Wohlfrom	101.1 R	1-20	----------	65	162	106	4	2	124	463	147	----------
Byron D. Beckwith	101.9 L	1-12	No diversion									
Maxwell Irrigation District	102.8 R	2-30, 1-36, 2-18	549	3,956	2,399	2,725	2,461	581	----------	11,971	[12]10	[12]1,059
American Trust Co. (Compton-Delevan Irrigation District)	103.7 R	1-16	----------	771	636	372	418	295	87	2,579	355	[13]160

Compton-Delevan Irrigation District	103.8 R	2-24, 1-36	No diversion								[14]	[14]
E. M. Gordon	103.9 R	1-16, 1-20	No diversion									
B. F. Gould	104.8 L	[15]1-26		48	555	107	234	117	210	1,271	570	
Thousand Acre Ranch (H. W. Keller)	106.0 R	1-14		37	117	82				236	187	
I. N. McVay[16]	108.5 L	1-12										
St. Johns Park Co. (W. A. Yerxa and Sons)	110.0 R	1-12		139	95	87	22			343	106	
Reclamation District 1004	112.1 L	1-24, 1-30										
		[17]1-50	1,325	5,358	7,609	7,250	6,582	2,652	310	31,086	385	1,944
Princeton-Codora-Glenn Irrigation District	112.4 R	3-24	834	3,313	3,402	3,943	2,290	99		13,881	[18]2,763	[18]2,597
A. J. Stone (Stone and Falkner)	112.6 L	1- 8				81				[19]81	140	
Edward L. Steel (Geo. Hansen)	115.5 L	1-12		2	25	1	10			38	40	
Butte City Ranch (W. C. Weeks)	115.8 R	1-12			39	36	4			79	55	
Anthony Rademacher	116.1 L	1-2½		0.8	0.9	0.5	0.1	0.4	0.6	3.3	3	
Butte City Ranch	116.7 R	1-12	Plant removed									
George Hansen[20]	117.8 R	[21]1-10				130				130	130	
Tom Crouch	119.0 L	1-10				26		22		48	50	
Staats, Klewe and Killebrew	123.8 R	1- 6	No diversion									
Princeton-Codora-Glenn Irrigation District	123.9 R	3-24	3,165	6,755	5,986	5,835	5,835	3,364	1,608	32,548	[22]	[22]
Provident Irrigation District	124.2 R	4-42, 1-36	4,982	18,821	14,764	15,121	14,858	5,739		[23]74,285	[24]462	[24]7,998
California Joint Stock Land Bank (Shellooe)	124.4 R	1-16		283	275	243	155	157		1,113	359	
C. L. Leonard	126.3 R	1-12	5	71	80	53	50	23	22	304	145	
Anna Kern	126.5 R	1-1½	No diversion									
J. E. Scharsch	130.8 R	1-1½	No diversion									

* Mileage along river above Southern Pacific Bridge, Sacramento.

[1] Erroneously listed as 15 in. in previous reports.

[2] Includes 39 acres irrigated on adjacent lands of Reichel.

[3] Listed previously as 18 in.

[4] Includes 21 acres on E. T. Niebling property.

[5] Includes 40 acres on Marsh property.

[6] This is combined acreage irrigated from plants at 95.7R and 96.8R.

[7] See plant at Mile 95.7R.

[8] An additional 15 acres irrigated from Boggs Plant (See Mile 98.8L).

[9] Sperry orchard, 50 acres, irrigated from Boggs Plant (See Mile 98.8L).

[10] Includes 50 acres for Sperry (See Mile 98.6L) and 15 acres for Beckley (See Mile 98.0L).

[11] Includes 80 acres irrigated for J. Boggs.

[12] Includes 435 rice and 10 alfalfa on the Packer Tract. Additional Maxwell Irrigation District areas watered from Colusa Trough (rice and gun clubs). See Colusa Trough Diversions.

[13] This acreage on west end of ranch irrigated from river plant up to June 1st then from plant on Colusa Trough in June. Rice abandoned July 1st.

[14] Compton-Delevan Irrigation District received its water through the plant of Glenn-Colusa Irrigation District, Mile 154.8R. Acreage irrigated by Compton-Delevan Irrigation District from this source was 2,394 rice

[15] Listed previously as 20 in.

[16] This plant pumps from a lake supplied only from winter flow and will not be listed as a river diversion in the future.

[17] Listed previously as 60 in.

[18] This is the combined acreage for both District Plants, 112.4R and 123.9R. The rice figure includes 655 acres in the district but irrigated from the Provident Irrigation District system. (See Mile 124.2R)

[19] Estimated—no operation record kept.

[20] Formerly Butte City Ranch.

[21] Former 6 in. replaced by 10 in.

[22] See plant at Mile 112.4R.

[23] Additional water was received through the Glenn-Colusa I. D. Plant. (See Mile 154.8R.)

[24] These figures include 2,812 rice and 65 general crops irrigated through the Glenn-Colusa I. D. Plant. The rice figure includes also 525 acres which were partially irrigated from drainage in Hunter Creek but does not include 655 acres which were irrigated for Princeton-Codora-Glenn I. D. (See Mile 112.4R.) The general crop figure includes 260 acres duck clubs.

TABLE 75—Continued

SACRAMENTO RIVER DIVERSIONS—1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion, April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Parrott-Phelan Estate	141.5 L	5-24	----------	----------	----------	1,578	2,164	1,000	----------	[14]4,742	[21]75	[21]1,200
Merrill Knight	146.7 L	1- 3	----------	----------	0.4	0.2	----------	----------	----------	0.6	1	----------
P. M. Rooney	146.9 L	1- 5	----------	----------	31	30	----------	----------	----------	61	25	----------
Henry Gianella[2]	150.0 L	1-10	----------	33	52	53	43	14	----------	195	107	----------
Joseph Gianella[4]	[5]150.0 L	1-10	No diversion									
Sacramento Valley Sugar Co.	151.0 R	1-12, 1-18	No diversion									
A. Holecek	152.2 R	1- 6	----------	1	----------	11	12	4	----------	28	30	----------
Maas Brothers	154.6 R	1- 5	----------	----------	2.5	1.1	2.1	1.5	0.4	7.6	16	----------
Glenn-Colusa, Jacinto, Compton-Delevan, and Provident Irrigation Districts	154.8 R	2-30, 1-42, 2-50 4-72, 1-100	[6]7,364	[6]72,711	70,179	69,841	68,384	30,872	12,400	[7]331,751	[8]18,056	[8]20,713
Geo. Butler (A. F. Landis)[9]	166.7 R	1- 3	----------	----------	----------	1.4	2.4	2.0	1.6	7.4	5	----------
Wm. H. Hall	166.8 R	1- 2	----------	0.9	1.7	0.9	0.9	1.0	0.6	6.0	4	----------
R. A. Foster	168.7 R	1- 5	No diversion									
R. A. Foster	169.1 R	1- 8	No diversion									
Hammon Stock Ranches[10]	169.8 R	1- 8	No diversion									
Hammon Stock Ranches[10]	170.7 R	1- 6	No diversion									
Hammon Stock Ranches[10]	171.2 R	1- 8	----------	----------	1	23	----------	----------	----------	24	40	----------
Hammon Stock Ranches[10]	174.2 R	1- 8	No diversion									
E. B. Noble (J. J. Silva)	184.5 R	1-14	----------	7	14	31	----------	----------	----------	52	100	----------
J. J. Silva[11]	185 3 R	1-10	----------	----------	----------	16	----------	17	----------	33	30	----------
T. K. Brearcliffe	192.5 R	1- 4	Plant removed									
R. R. Howell[12]	193.5 L	1-1½, 1-4	2	2	4	4	4	4	3	[13]23	6	----------
S. E. Ayer[14]	193.6 R	1- 3	----------	----------	1.6	3.2	----------	----------	----------	[15]4.8	4	----------
S. E. Ayer	194.1 R	1- 6	----------	----------	5	25	3	----------	----------	33	32	----------
G. E. Sutton	196.2 R	1- 6	0.2	2.0	5.9	6.8	6.5	0.6	1.5	23.5	15	----------
J. A. Edwards[16]	196.2 L	1- 6	----------	----------	20	62	----------	----------	----------	82	30	----------
A. W. Gibson (T. A. Crook)	196.4 L	1- 8	----------	32	13	9	11	----------	----------	65	15	----------
W. E. Johnson	196.5 L	1- 4	----------	6	16	7	----------	----------	----------	29	27	----------
J. Erickson	196.6 L	1- 3, 1- 5	----------	4	11	5	----------	----------	2	22	27	----------
H. P. Stice	197.0 L	1- 8	----------	20	56	62	77	22	----------	237	72	----------
W. H. Freemeyer[17]	197.6 L	1- 4	Plant removed									
Freemeyer Brothers[18]	197.65L	1- 3	----------	----------	5	1	----------	----------	----------	[18]6	[18]20	----------
Pearl Edwards	197.73L	1- 6	----------	----------	1.6	3.5	----------	----------	----------	5.1	10	----------
Griffen Brothers[19]	206.0 L	1- 6	----------	19	----------	----------	----------	----------	----------	19	23	----------
Jesse Alford[20]	209.0 L	1- 2½	----------	----------	----------	----------	0.3	----------	----------	0.3	2	----------
J. F. Nunas	215.5 R	1- 7	No diversion									
J. F. Nunas	216.0 R	1- 3	----------	----------	4	14	8	----------	----------	26	18	----------
W. A. Hunaeus	216.4 L	1- 3	----------	----------	3	3	1	----------	----------	7	9	----------

Haskins Brothers[21]	218.0 L	1- 4	----------	----------	13	15	----------	----------	----------	28	30	----------
Johnson and Coates	221.0 R	1-10	----------	55	274	163	47	6	9	554	460	----------
W. Northrup (V. V. Apperson)[22]	233.0 L	1- 6, 1- 4	----------	----------	5.7	----------	----------	----------	----------	5.7	10	----------
Wm. Menzel Meat Co.	240.2 L	1-12	----------	167	70	153	160	139	----------	689	75	----------
Harris and Dempster and J. L. Henderson[23]	240.5 L	1-10	----------	21	7	20	11	7	----------	66	[24]10	----------
M. Leonardini Estate (Graf and Graf)	242.0 L	1- 8	----------	20	84	50	75	47	3	279	55	----------
Adams Brothers	242.5 R	1- 6	----------	25	15	19	21	11	2	93	67	----------
John Diestelhorst	243.0 R	1- 5	2	29	31	31	26	20	11	[25]150	30	----------
Anderson Cottonwood Irrigation District	243.0 R	Gravity	2,100	17,400	20,000	21,400	21,300	20,300	8,700	[26]111,200	[27]20,000	----------
Totals	----------	----------	52,335	207,747	229,261	227,058	214,549	92,114	29,574	1,052,638	88,218	63,546

* Mileage along river above Southern Pacific bridge, Sacramento.

[1] Additional water for acreage shown was obtained from Butte Creek.

[2] All Parrott Investment Co.—no Phelan acreage, 1928.

[3] Formerly Gianella Heirs Co.

[4] Formerly Manuel Miguel Co. (G. F. Alves).

[5] Pump on Nord Slough or Pine Creek Lagoon which joins Sacramento River at Mile 147.0L. Plant is located three miles up slough on right bank or opposite Mile 150.0L, Sacramento River.

[6] In April and May additional water was diverted to the Glenn-Colusa Irrigation District Canal by gravity from Stony Creek as follows: April 10th to 30th, 8,800 acre-feet; May 1st to 21st, 1,440 acre-feet.

[7] Water for Glenn-Colusa, Jacinto, Compton-Delevan and Provident Irrigation Districts is all diverted at this pumping plant. The diversion figures given are the totals for this plant. The water for Jacinto and Provident Irrigation districts was delivered to them from the Glenn-Colusa Irrigation District Canal as follows: (Acre-feet)—Jacinto: April, 30; May, 1,549; June, 1,884; July, 2,149 August, 1,973; September, 1,047; October, 554; total, 9186. Provident: April, 164; May, 5,614; June, 5,659; July, 5,133; August, 4,163; September, 1,771; total, 22,504. The water for Compton-Delevan Irrigation District was delivered to Funks Creek from the Glenn-Colusa Canal at a point in the NE¼ Sec. 18, T. 17 N, R. 3 W., as follows: (Acre-feet) April, 600; May, 5,070; June, 4,620; July, 3,970; August, 3,620; September, 978; total, 18,858. See lower river plants of Provident District at Mile 124.2R and Compton-Delevan at Mile 103.7R and 103.8R. There was an additional diversion of 1,100 acre-feet in November for the Glenn-Colusa Irrigation District.

[8] These figures include Jacinto and Compton-Delevan Irrigation District areas irrigated through the Glenn-Colusa plant as follows: Jacinto, 2,685 general crops; Compton-Delevan, 2,394 rice. They do not include Provident Irrigation District areas served through the Glenn-Colusa plant as follows: 2,812 rice and 65 general. The rice figure includes 225 acres irrigated for I. G. Zumwalt outside the district, and the general crop figure includes 1,188 acres within and 400 acres outside the district served for filling or freshening duck ponds.

[9] Formerly J. M. Wight.

[10] Formerly Finnell Land Co.

[11] New installation, 1928.

[12] Not previously listed but owner states plant was operated in 1924 and 1927, in the latter year for 25 acres alfalfa. No operation, 1925 and 1926.

[13] Diversions estimated; gas pump and no operation record.

[14] Not listed previous to 1928.

[15] No operation record kept. Gas pump. Diversions estimated.

[16] Listed as W. E. Edwards, 1927.

[17] This plant was listed as G. W. Freemeyer in 1927.

[18] Through error no diversion was reported for this plant in 1927 when it was operated for the irrigation of the same acreage as in 1928. This plant was listed as W. H. Freemeyer in 1927.

[19] Formerly Bank of Tehama (I. W. Griffen).

[20] Formerly Hathaway and Wohlf.

[21] Listed previously as J. C. Haskins.

[22] Formerly Smith and George.

[23] Listed previously as Harris Bros. (Harris & Dempster).

[24] J. L. Henderson land.

[25] This pump runs practically continuously throughout the irrigation season but excess water runs right back to river through gardens. Actual seasonal diversion by the pump was 647 acre-feet but the use for the 30 acres is estimated at 5 acre-feet per acre or 150 acre-feet as shown.

[26] There is a considerable amount of water from this diversion which is returned to the Sacramento River through the creek channels between Redding and south of Cottonwood. An estimate (from observation of these channels at various times during the season) of this return water (including seepage to the channels) for the 1928 season gives the following: (Acre-feet) May, 3,500; June, 3,500; July, 2,500; August, 2,000; September, 2,500; October, 1,000; total, 15,000.

[27] Of this amount, 10,195 acres only were directly irrigated, but the district manager estimates that the remaining acreage received a definite benefit through sub-irrigation from the raised water table and seepage.

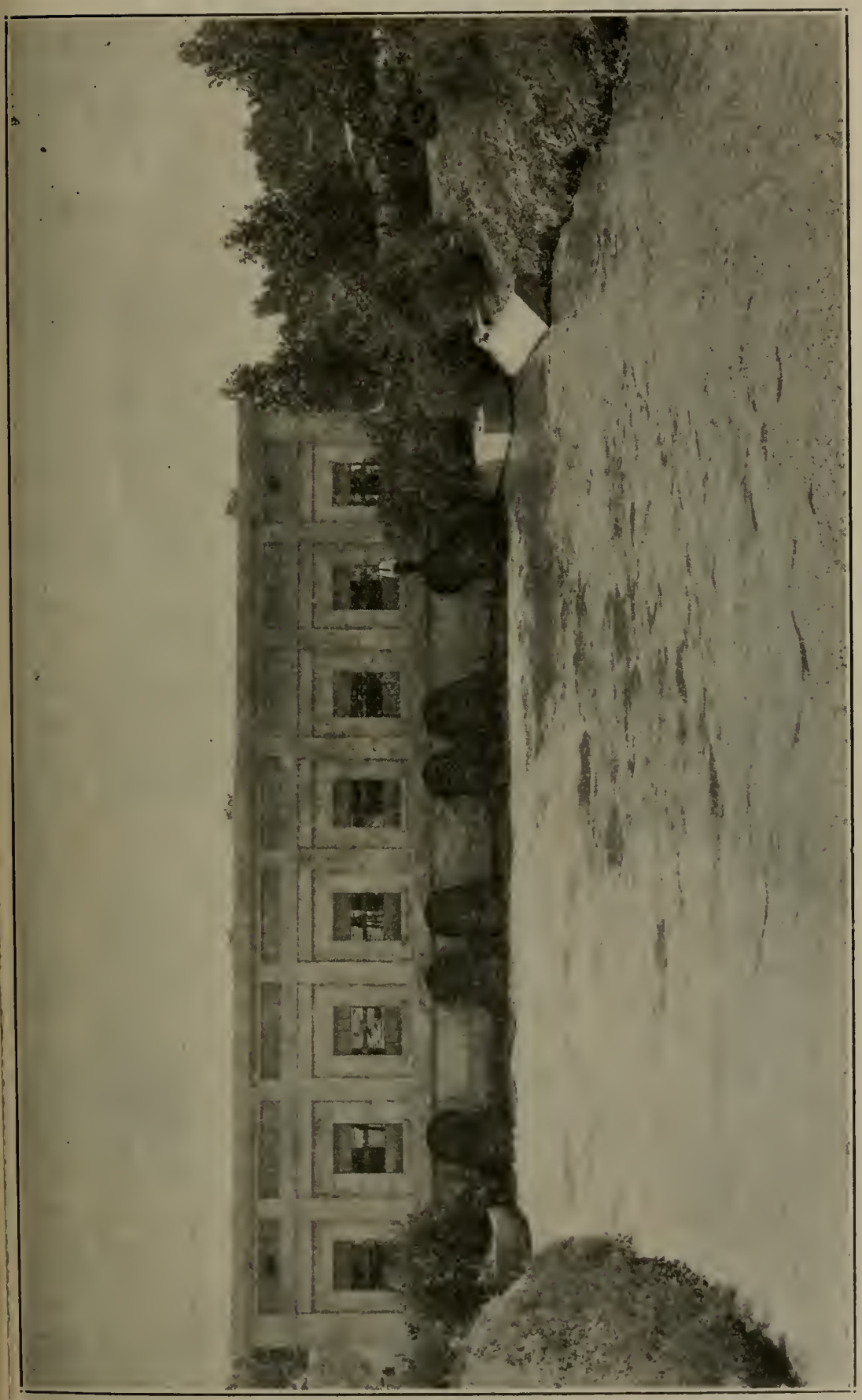

PLATE 3—One of the Largest Irrigation Pumping Plants on the Upper Sacramento River.

TABLE 76

*COLUSA TROUGH DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	**Location	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	Sept.	October		General	Rice
1924												
Compton-Delevan Irrigation District	SE¼ NE¼, Sec. 9, T. 17 N., R. 2 W Right bank	2-36, 1-24	2,470	6,010	6,590	6,020	5,090	2,510	----	28,690	----	[4]4,000
Maxwell Irrigation District	SW¼ SE¼, Sec. 33, T. 17 N., R. 2 W.	1-26	330	730	1,010	1,130	1,220	[2]204	[3]676	5,309	[1]1,820	1,466
Capital Outing Club (Maxwell Irrigation District Pump)	SW¼ NW¼, Sec. 20, T. 16 N., R. 2 W on Lateral "F" Left bank	1-20	----	----	----	----	143	284	47	474	Gun club	
Maxwell Irrigation District (Gun club)	SE¼ NW¼, Sec. 21, T. 16 N., R. 2. W. Right bank	1-12	----	----	----	56	176	80	11	323	Gun club	
A. D. J. Land Co.	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Left bank	1-6	----	----	38	95	83	87	69	372	Gun club	
	Totals	----	2,800	6,740	7,638	7,301	6,712	3,165	803	35,159	1,820	5,466
1925												
Compton-Delevan Irrigation District	SE¼ NE¼, Sec. 9, T. 17 N., R. 2 W (projected) Right bank	1-30	----	----	309	14	406	214	----	943	----	[2]2,500
Maxwell Irrigation District	SW¼ SE¼, Sec. 33, T. 17 N., R. 2 W Right bank	1-26	----	422	1,342	1,603	1,860	1,800	1,094	8,121	---- Gun clubs	[4]1,500
Maxwell Irrigation District (Capital Gun Club)	SW¼ NW¼, Sec. 20, T. 16 N., R. 2 W., on lateral "F" Left bank	1-20	----	----	----	37	881	484	76	1,478	Gun club	

Mazwell Irrigation District (Gun club)	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Right bank	1-12					111	117	76	304	Gun club	
A. D. J. Land Co.	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Left bank	1-12					127	66	99	292	Gun club	
I. G. Zumwalt	NE¼ NW¼, Sec. 28, T. 16 N., R. 2 W. Right bank	1-36		1,970	2,428	3,274	1,879	375	136	10,062		4,600
	Totals			2,392	4,079	4,928	5,264	3,056	1,481	21,200		8,600
1926												
Compton-Delevan Irrigation District	SE¼ NE¼, Sec. 19, T. 17 N., R. 2 W. Right bank	1-30	No diversion									
Maxwell Irrigation District	SW¼ SE¼, Sec. 33, T. 17 N., R. 2 W. Right bank	1-26		123	1,268	2,542	2,542	[6]2,460	[6]2,542	[6]11,477		[6]955
Maxwell Irrigation District (Duck club plant)	SW¼ NW¼, Sec. 20, T. 16 N., R. 2 W. Left bank	1-20			552	578		792	176	2,098	Duck clubs	
Maxwell Irrigation District	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Right bank	1-12	No diversion									
A. D. J. Land Co.	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Left bank	1- 6	Operated only for duck clubs after September 3d [7]									
I. G. Zumwalt	NE¼ NW¼, Sec. 28, T. 16 N., R. 2 W. Right bank	1-36	No diversion									
	Totals			123	1,820	3,120	2,542	3,252	2,718	13,575		955

* Main drain of Reclamation District 2047.
** Pumps tabulated in downstream order.
[1] This acreage irrigated from both Colusa Trough and Sacramento River pumping plants, the greater portion from the trough. See river diversions.
[2] September and October diversions for gun clubs.
[3] This is the total acreage irrigated from this plant and the river plant. See river diversion. For this acreage also the district received 8,126 acre-feet during the season from the Glenn-Colusa Irrigation District. See diversions, Mile 154.8R, Sacramento River.
[4] Total acreage served from this plant and river plant. Beginning August 3rd, the greater portion of diversion was for duck clubs.
[5] Under canal from river plant also. (See river diversions, Mile 102.8R). This acreage is also listed under the river plant.
[6] The most of September and October, diversions were for filling ponds of duck clubs.
[7] Clubs were advised by the water supervisor on September 3rd that diversions for duck pond purposes could be permitted for remainder of season.

TABLE 76—Continued

*COLUSA TROUGH DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	**Location	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	Sept.	October		General	Rice
1927												
Henry Jameson and John Rosenfelds Sons (Anthony & Garnett)[1]	SW¼ SE¼, Sec. 23, T. 19 N., R. 2 W.											
	Right bank	1-16	.....	257	616	570	589	431	.....	2,463	.....	160
Helphenstine and Rush (Whiting)	NE¼ SE¼, Sec. 4, T. 17 N., R. 2 W.											
	Left bank	Menge 24	.....	660	510	496	496	360	.....	2,522	.....	290
Compton-Delevan Irrigation District	SE¼ NE¼, Sec. 19, T. 17 N., R. 2 W.											
	Right bank	1-30	.....	No diversion								
Maxwell Irrigation District (Plant No. 2A)	SW¼ SE¼, Sec. 33, T. 17 N., R. 2 W.											
	Right bank	1-26, [2]1-15	.....	.....	.....	.....	1,252	2,081	3,209	6,542	[3]5,208	.....
Maxwell Irrigation District (Plant No. 6)	SW¼ NW¼, Sec. 20, T. 16 N., R. 2 W.											
	Left bank	[4]1-20, 1-12	.....	.....	.....	84	1,097	1,904	1,190	4,275	(5)	.....
A. D. J. Land Co.	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W.											
	Left bank	1- 6	.....	.....	.....	68	107	108	121	404	Duck club	
I. G. Zumwalt	NE¼ NW¼, Sec. 28, T. 16 N., R. 2 W.											
	Right bank	1-36	.....	No diversion								
Hattie O'Hair	NE¼ NE¼, Sec. 2, T. 15 N., R. 2 W.											
	Left bank[6]	Menge 16	.....	177	248	220	195	62	.....	902	.....	110
Tuttle Land Co.	NE¼ NE¼, Sec. 2, T. 15 N., R. 2 W.											
	Left bank[6]	Menge 16	.....	260	300	310	310	180	.....	1,360	.....	240
	Totals		.....	1,354	1,674	1,748	4,046	5,126	4,520	18,468	5,208	900

Henry Jameson	SW¼ SE¼, Sec. 23, T. 19 N., R. 2 W. Right bank	1-16	237	520	598	652	598	126		2,731		200
Helphenstine and Rush (Whiting)	NE¼ SE¼, Sec. 4, T. 17 N., R. 2 W. Left bank	Box 24	Plant re	moved								
Compton-Delevan Irrigation District	SE¼ NE¼, Sec. 19, T. 17 N., R. 2 W. Right bank	1-30	No diver	sion								
American Trust Co. (C. J. Whiting)[7]	NE¼ NE¼, Sec. 17, T. 17 N., R. 2 W. Left bank	Box 3′ x 5′			154					[8]154		[8]160
Maxwell Irrigation District (Plant No. 2A)[9]	SW¼ SE¼, Sec. 33, T. 17 N., R. 2 W. Right bank	1-26, 1-15	76	2,537	1,710	1,840	2,225	2,462	2,003	12,853	[3]3,640	1,154
Pete Larie	NE¼ NW¼, Sec. 16, T. 16 N., R. 2 W. Right bank	Box 32						78	([10])	[10]78	[10]100	
Maxwell Irrigation District (Plant No. 6)	SW¼ NW¼, Sec. 20, T. 16 N., R. 2 W. Left bank	1-20, 1-12						368	73	441	([5])	
Sacramento Shooting Club[7]	SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W. Right bank	Box 36	No diver	sion prior	to Septem	ber 1st					Duck cl	ub
A. D. J. Land Co.	SE¼ NW¼, Sec. 21, T. 16 N., R 2 W. Left bank	1- 6	No diver	sion prior	to Septem	ber 1st					Duck cl	ub
I. G. Zumwalt	NE¼ NW¼, Sec. 28, T. 16 N., R. 2 W. Right bank	1-36	No diver	sion								
Hattie O'Hair	NE¼ NE¼, Sec. 2, T. 15 N., R. 2 W. Left bank[6]	Box 10	No diver	sion								
Tuttle Land Co.	NE¼ NE¼, Sec. 2, T. 15 N R 2 W. Left bank[6]	Box 10	No diver	sion								
	Totals		313	3,057	2,462	2,492	2,823	3,034	2,076	16,257	3,740	1,514

* Main drain of Reclamation District 2047.
** Pumps tabulated in downstream order.
[1] Not previously listed, but this plant has operated in previous years.
[2] Additional installation, 1927.
[3] Duck club acreage. This is the total duck club acreage served from both Colusa Trough plants of the District.
[4] 12″ pump moved to this location from SE¼ NW¼, Sec. 21, T. 16 N., R. 2 W, Right bank, as listed for 1926.
[5] See Plant No. 2A.
[6] On Powell Slough tributary to main canal of Dist. 2047 (Trough) in SW¼ SW¼ Sec. 1, T. 15 N., R 2 W.
[7] New installation 1928.
[8] This acreage irrigated from Sacramento River plant (see Mile 103.7R) up to June 1st. Rice abandoned July 1st.
[9] Additional District lands irrigated from Sacramento River—see Mile 102.8R.
[10] Record was not kept after October 1st, when the plant was operated for duck grounds.

TABLE 77

**BACK BORROW PIT DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		Rice only
1924											
River Farms Company (E. C. Eldridge)	1.45L	1-14	264	552	720	622	663	225	----------	3,046	300
1925											
River Farms Company (E. C. Eldridge)	1.45L	1-14	No diversion								
W. P. Dwyer (Kent J. C. Seymour)	6.6 R	1-20, 1-12	----------	1,000	1,630	1,602	1,446	292	----------	5,970	760
Hershey Estate (K. Kawada)	11.15R	1-18, 1-14	----------	----------	498	806	841	78	----------	2,223	500
B. F. Mumma	14.75R	1-10	----------	27.2	114	105.6	87.8	48.4	----------	383	80
Totals	----------	----------	----------	1,027	2,242	2,514	2,375	418	----------	8,576	1,340
1926											
W. P. Dwyer (Lamping and Seymour)	4.35R	1-20	----------	744	1,284	1,207	1,122	----------	----------	4,357	680
W. P. Dwyer (Koda and Seymour)	8.8 R	1-12, 1-16	----------	1,173	1,488	1,403	1,010	277	----------	5,351	700
Hershey Estate (K. Kawada)	13.75R	1-14	----------	708	1,369	1,332	942	----------	----------	4,351	650
B. F. Mumma	14.75R	1-10	----------	99	93	101	74	16	----------	383	90
County Line Gun Club (M. L. Emmert)	15.75R	1-15	Operated only for duck club after September 3d[1]								
Totals	----------	----------	----------	2,724	4,234	4,043	3,148	293	----------	14,442	2,120
1927											
W. P. Dwyer	4.35R	(2)	No diversion								
W. P. Dwyer	8.8 R	(2)	No diversion								
Hershey Estate[3]	11.15R	1-14	57	553	850	973	1,007	461	----------	3,901	400
Hershey Estate	13.75R	(2)	No diversion								
B. F. Mumma	14.75R	1-10	----------	139	128	149	135	32	----------	583	105
County Line Gun Club	15.75R	1-15	Operated for duck club only after September 1st								
T. H. Mumma[4]	20.0 R	1-15	----------	370	537	658	762	479	----------	2,806	450
G. Gregory, J. W. Browning, M. Kindery, M. Brindenburg (K. J. C. Seymour and Koda)[4]	22.15R	1-12, 1-16	104	1,456	1,436	1,475	1,488	528	----------	6,487	950
Totals	----------	----------	161	2,518	2,951	3,255	3,392	1,500	----------	13,777	1,905

1928											
Hershey Estate	11.15R	1-14	No diversion								
B. F. Mumma	14.75R	1-10	----------	113	136	125	121	66	----------	561	105
County Line Gun Club	15.75R	1-15	----------						----------	(*)	(*)
T. H. Mumma	20.0 R	1-15	----------	668	706	660	605	237	----------	2,876	475
G. Gregory, J. W. Browning, M. Kindery, M. Brindenburg (K. J. C. Seymour and Koda)	22.15R	1-12, 1-16	No diversion								
Totals	----------	----------	----------	781	842	785	726	303	----------	3,437	580

*Mileage along Borrow Pit from Horseshoe outfall gate just above junction of Borrow Pit with Sacramento River at Knights Landing.
**Carries return water from Colusa Basin along west border of Reclamation Districts 108 and 787 and thence to discharge to Sacramento River at Knights Landing.
[1] Clubs were advised by the Water Supervisor on September 3d that diversions for duck pond purposes could thereafter be permitted.
[2] Pump removed 1927.
[3] New installation 1927—Previously installed and operated 1925.
[4] New installation 1927.
[5] Some diversion for duck grounds July, August, and September—No operation record.

TABLE 78

LOWER BUTTE CREEK AND BUTTE SLOUGH DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
1924											
LOWER BUTTE CREEK											
Colusa Delta Farms	3.9 R	1-16					307	39		346	455
Butte Lodge Gun Club	4.0 R	1-22					115	418	97	630	Gun Club
BUTTE SLOUGH											
M. Marty	0.3 W	1-12			122	50	19	12	16	219	55
Ira Nall	3.5 W	1-10	53	37	59	66	62	23		300	75
R. F. Lemen	3.7 W	1-10	34	26	37	25	15	15		152	49
Sam Reische	4.1 W	1-12	62	59	19	145	134	77		496	150
Dr. E. V. Jacobs	4.8 W	1-10	53	17	118	81	14	68		351	60
L. Putman and Max Reichell	5.1 W	1-10	291	97		36	34			458	106
Thompson and Nall	6.6 W	1- 6			10	6	6	10		32	9
Totals, Lower Butte Creek and Butte Slough			493	236	365	409	706	662	113	2,984	959
1925											
LOWER BUTTE CREEK											
Colusa Delta Farms Co.	3.9 R	1-16					428			428	500
Butte Lodge Gun Club	4.0 R	1-22					260	563	310	1,133	Gun Club
BUTTE SLOUGH											
M. Marty	0.3 W	1-12			72		98	32		202	45
I. E. Nall	3.5 W	1-10			29	24	24	16	1	94	80
W. H. Ross (R. F. Lemen)	3.7 W	1-10			75	31	31	34		171	44
S. E. Reische	4.1 W	1-12			23	108	88	9		228	150
Dr. E. V. Jacobs (G. M. Gomez)	4.8 W	1-10				129	61	65	1	256	85
L. Putman and Max Reichell	5.1 W	1-10	No diversion								
Thompson and Nall	6.6 W	1- 6	No diversion								
Totals, Lower Butte Creek and Butte Slough					199	292	990	719	312	2,512	904

1926											
LOWER BUTTE CREEK											
Colusa Delta Farms Co.[1] (Reclamation District 1004)	3.9 R	1-16				32	115			147	179
Butte Lodge Gun Club	4.0 R	1-22	Operated	only for du	ck club aft	er Septemb	er 3d[2]				
Winchester Gun Club[3]	Opp. 5.5L	1-12				68			230	298	Duck Club
South Butte Gun Club[3]	Opp. 5.5L	1-10				92			281	373	Duck Club
John Hannah (A. L. Dickow)	[4]20.2 R	1-10		179	331	271	199			980	Rice 90
BUTTE SLOUGH											
M. Marty	0.3 W	1-12			39	56	16	25		136	85
I. E. Nall	3.5 W	1-10		23	82	60	69	6		240	103
W. H. Ross (R. F. Lemen)	3.7 W	1-10			31	28	22	17		98	31
S. E. Reische	4.1 W	1-12		21	91	54	84	6		256	172
Dr. E. V. Jacobs	4.8 W	1-10				134	54	60		248	85
L. Putman	5.1 W	1-10				103	3			106	44
Thompson and Nall	6.6 W	1- 6	No diver	sion							
Totals, Lower Butte Creek and Butte Slough				223	574	898	562	114	511	2,882	789
1927											
LOWER BUTTE CREEK[5]											
Reclamation District 1004 (Colusa Delta Farms Co.)	3.9 R	1-15, 1-12				61	579	63		703	450
John Hannah (Dickow and Nissen)	20.2 R	20 in. Menge		316	332	295	303	208		1,454	Rice 160
John Hannah (L. A. Ray)[6]	21.2 R	20 in. Menge		210	312	318	296	163		1,299	Rice 160
BUTTE SLOUGH											
M. Marty	0.3 W	1-12			62	56	34		28	180	47
I. E. Nall	3.5 W	1-10		11	23	47	30	27		138	110
W. H. Ross (C. E. Ray)	3.7 W	1-10		9	12	14	11	3		49	46
P. A. Reische[7]	4.1 W	1-12			88	60	96	10	15	269	196
Dr. E. V. Jacobs (Gomez)	4.8 W	1-10				110	99	78		287	85
L. F. Putman	5.1 W	1-10			29	90	55			174	334
Thompson and Nall	6.6 W	([8])	No diver	sion							
W. G. Thompson[6]	7.6 W	1- 2				0.2	0.2			0.4	2
Totals, Lower Butte Creek and Butte Slough				546	858	1,051	1,503	552	43	4,553	1,590

*Approximate mileage along creek or slough from junction with Sacramento River.

**All general crops except as noted.

[1] See Sacramento River, Mile 89.3L for Colusa Delta Farm Lands irrigated from other sources.

[2] Clubs were advised by the water supervisor on September 3d that diversions for duck pond purposes could thereafter be permitted.

[3] Pump is on dredger cut extending east from lake in Butte Basin. Pump is about 3 miles due east from a point on Butte Creek, which would be Mile 5.5L. The Winchester pump is about 800 feet east of the South Butte pump and approximately 1,000 ft. west of the county road skirting the west side of Marysville Buttes.

[4] 0.9 mile north of Biggs road.

[5] Gun club diversions are listed only when diversions in considerable quantity were made prior to September 1st.

[6] New installation 1927.

[7] Previously listed as S. E. Reische.

[8] Plant dismantled.

TABLE 78—Continued

LOWER BUTTE CREEK AND BUTTE SLOUGH DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
1928											
LOWER BUTTE CREEK											
El Anzar Gun Club	[1]3.9 L	1-10	No div	ersion prior	to Septem	ber 1st					
Reclamation District 1004 (Colusa Delta Farms Co.)	3.9 R	1-15, 1-12	No div	ersion							
Butte Lodge Gun Club	4.0 R	1-22	----------	----------	----------	----------	386	737	([2])	[2]1,123	Duck Club
South Butte Gun Club	Opp. 5.5L	1-10	No div	ersion prior	to Septem	ber 1st					Duck Club
Winchester Gun Club	Opp. 5.5L	1-12	----------	----------	----------	20	234	([2])	([2])	[2]254	Duck Club
John Hannah (Dickow and Nissen)	20.2 R	20 in. Menge	No div	ersion							
John Hannah (Ray and King)	21.2 R	[3]3 ft. x 3 ft. box	----------	414	385	403	403	156	----------	1,761	Rice 160
BUTTE SLOUGH											
M. Marty	0.3 W	1-12	----------	----------	45	87	22	----------	----------	154	60
I. E. Nall	3.5 W	1-10	----------	26	39	77	64	14	4	224	118
W. H. Ross (C. E. Ray)	3.7 W	1-10	----------	10	16	10	12	4	----------	52	55
P. A. Reische	4.1 W	1-12	----------	1	115	88	142	10	21	377	211
E. V. Jacobs (G. M. Gomez)	4.8 W	1-10	----------	----------	50	157	111	86	18	422	110
L. F. Putman (M. Charge)	5.1 W	1-10	----------	----------	----------	7	----------	----------	----------	7	[4]10
W. G. Thompson	7.6 W	1- 2	No div	ersion							
Totals, Lower Butte Creek and Butte Slough	----------	----------	----------	451	650	849	1,374	1,007	43	4,374	724

* Approximate mileage along creek or slough from junction with Sacramento River.

** All general crops except as noted.

[1] On a barge.

[2] Pumping continued later in season but record was not continued. With the duck club diversions the purpose is to show only such diversions as may occur prior to September 1st, when there would be a possibility of interference with other water uses.

[3] New pump replaced that of 1927.

[4] Acreage irrigated was land of J. W. Browning.

TABLE 79

BY-PASS AND DRAINAGE CHANNEL DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	Location	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	[1]Acreage irrigated
			April	May	June	July	August	Sept.	October		
1924											
YOLO BY-PASS (TULE CANAL)											
Robert Swanston	East Borrow Pit, ½ mile north of north levee of Sacramento By-Pass	1-18		456	251	322	133	54		1,216	480
1925											
TISDALE BY-PASS											
Sutter Basin Co.	No. 1—6″-SW¼ SW¼, Sec. 29, T. 14 N., R. 1 E. South bank	1- 6									
	No. 2—12″-SE¼ SW¼, Sec. 28, T. 14 N., R. 1 E. South bank	1-12				292	132			424	100
SUTTER BY-PASS											
R. L. Moorehead	SW¼ NE¼, Sec. 24, T. 15 N., R. 1 E. East Borrow Pit	1-10					132	24	40	196	70
Tobasco Gun Club	NW¼ SW¼, Sec. 33, T. 15 N., R. 2 E. East Borrow Pit	Gravity						150		150	Duck club
M. Spurgeon Gun Club	SW¼ SW¼, Sec. 35, T. 14 N., R. 2 E.	1- 7						167	129	296	Duck club
Spurgeon Aero Gun Club	SE¼ SE¼, Sec. 12, T. 13 N., R. 2 E.	1-10						200	273	473	Duck club
San Francisco Outing Club	NW¼ NW¼, Sec. 20, T. 13 N., R. 3 E.	1- 6						22	110	132	Duck club
	Totals (Sutter By-Pass)						132	563	552	1,247	70
1926											
TISDALE BY-PASS											
Sutter Basin Co.	No. 1—6″-SW¼ SW¼, Sec. 29, T. 14 N., R. 1 E. South bank	1- 6				32				32	[2]90
Sutter Basin Co.	No. 2—12″-SE¼ SW¼, Sec. 28, T. 14 N., R. 1 E. South bank	1-12				41				41	([3])

[1] All general crops, except as noted.
[2] Total acreage irrigated from both Sutter Basin Co. pumps.
[3] See Pump No. 1.

TABLE 79—Continued

BY-PASS AND DRAINAGE CHANNEL DIVERSIONS, 1924 TO 1928, INCLUSIVE

Water user	Location	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	[1]Acreage irrigated
			April	May	June	July	August	Sept.	October		
1926—Continued											
SUTTER BY-PASS											
R. L. Moorehead	$SW^1/_4$ $NE^1/_4$, Sec. 24, T. 15 N., R. 1 E. East Borrow Pit	1-10			38	129	36	69		263	[1]146
Duck clubs	As per 1925 list		Operated only for Diversions		duck clubs after September 3 d. not recorded[2].						Duck club
YOLO BY-PASS (TULE CANAL)											
Robert Swanston	East Borrow Pit, $^1/_2$ mile north of north levee of Sacramento By-Pass	1-15	No diversion								
KNIGHTS LANDING RIDGE CUT											
Russell Brothers	$NE^1/_4$ $SW^1/_4$, Sec. 25, T. 11 N., R. 2 E. North bank	1-12			34	33	27	27		121	55
1927											
TISDALE BY-PASS											
Sutter Basin Co.	No. 1—6″-$SW^1/_4$ $SW^1/_4$, Sec. 29, T. 14 N., R. 1 E. South bank	1- 6	No diversion								
Sutter Basin Co.	No. 2—12″-$SE^1/_4$ $SW^1/_4$, Sec. 28, T. 14 N., R. 1 E. South bank	1-12	No diversion								
SUTTER BY-PASS											
R. L. Moorehead	$SW^1/_4$ $NE^1/_4$, Sec. 24, T. 15 N., R. 1 E. East Borrow Pit	1-10			144		71	61		276	125
Sutter Basin Co. (W. W. Thornton)	$SW^1/_4$ $SE^1/_4$, Sec. 3, T. 12 N., R. 3 E.	1- 8				18	16			34	140
Sutter Basin Co. (Sacramento sl. plant)	$NW^1/_4$ $SW^1/_4$, Sec. 21, T. 11 N., R. 3 E.	1-12				46	34			80	100
YOLO BY-PASS (TULE CANAL)											
Basil Beach	$SE^1/_4$ $NE^1/_4$, Sec. 9, T. 10 N., R. 3 E.	1-10				94	49			143	225
Robert Swanston	East Borrow Pit, $^1/_2$ mile north of north levee of Sacramento By-Pass	1-15			No diversion						
BACK BORROW PIT RECLAMATION DISTRICT 1000											
W. F. Sandercock (LeClare and Green)	$SE^1/_4$ $NE^1/_4$, Sec. 26, T. 9 N., R. 4 E.	1-10					28			28	67

KNIGHTS LANDING RIDGE CUT											
Russell Brothers	NE¼ SW¼, Sec. 25, T. 11 N., R. 2 E. North bank	•1-12			29	34	65	20		148	55
1928											
TISDALE BY-PASS											
Sutter Basin Co.	No. 1—6″-SW¼ SW¼, Sec. 29, T. 14 N., R. 1 E. South bank	1- 6	No diversion								
Sutter Basin Co.	No. 2—12″-SE¼ SW¼, Sec. 28, T. 14 N., R. 1 E. South bank	1-12	No diversion								
SUTTER BY-PASS											
D. C. Smith, E. I. McGrath and S. A. McKeehan	NE¼ NW¼, Sec. 25, T. 15 N., R. 1 E. West Borrow Pit	1-10		168	252	252	252	168		[3]1,092	1,200
R. L. Moorehead	SW¼ NE¼, Sec. 24, T. 15 N., R. 1 E. East Borrow Pit	1-10			116	41	53	21		231	124
Sutter Basin Co. (E. H. Christensen)	NW¼ NW¼, Sec. 20, T. 13 N., R. 3 E. East Borrow Pit	1-16		704	636	823	719	378		3,260	275 Rice
Sutter Basin Co. (W. W. Thornton)	SW¼ SE¼, Sec. 3, T. 12 N., R. 3 E. Willow Slough	1- 8	No diversion								
Sutter Basin Co. (Musser and Seydel)	NW¼ SW¼, Sec. 21, T. 11 N., R. 3 E. Sacramento Slough	1-12				49	32			[4]81	100
YOLO BY-PASS (TULE CANAL)											
Basil Beach	SE¼ NE¼, Sec. 9, T. 10 N., R. 3 E.	1-10				275	159	13		447	300
Robert Swanston	East Borrow Pit, ½ mile north of north levee, Sacramento By-Pass	1-15	No diversion								
BACK BORROW PIT											
RECLAMATION DISTRICT 1000											
W. F. Sandercock (LeClare and Green)	SE¼ NE¼, Sec. 26, T. 9 N., R. 4 E.	1-10			55					55	74
KNIGHTS LANDING RIDGE CUT											
Russell Brothers	NE¼ SW¼, Sec. 25, T. 11 N., R. 2 E. North bank	1-12			48	28	29	53		158	80

[1] Includes 67 acres irrigated on lands of E. Platter.
[2] Clubs were advised by the water supervisor on September 3rd that diversions for duck pond purposes could thereafter be permitted.
[3] Diversions estimated—gasoline motor—no accurate operation record kept.
[4] No operation record kept. Gasoline motor. Same acreage irrigated as in 1927 and diversion was estimated to be same as 1927.

TABLE 80

*FEATHER RIVER DIVERSIONS, 1924

Water user	**Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion March to October, acre-feet	Acreage irrigated	
			March	April	May	June	July	August	September	October		General	Rice
Robert E. Shields	1.55L	1-6	----------	----------	----------	----------	----------	----------	97	----------	97	40	----------
R. Catlett	3.13L	1-8	----------	[1]30	[1]120	----------	----------	----------	----------	----------	[1]150	80	----------
S. A. McKeehan	5.44L	1-6	----------	----------	----------	----------	----------	----------	93	----------	93	40	----------
M. Schreiber	7.70L	1-8	----------	----------	39	69	58	72	34	----------	272	120	----------
F. Parker	9.75R	1-12	----------	----------	127	332	242	15	115	268	1,099	60	----------
Garden Highway Orchard Co.	13.1 R	1-20, 1-24	----------	----------	989	668	580	526	385	----------	3,148	1,400	----------
Farm Land Investment Co.	16.0 L	1-20	----------	----------	743	736	331	1,030	105	----------	2,945	----------	800
Alicia Mutual Water Co.	24.0 L	1-16	----------	396	1,400	1,070	1,400	1,480	1,310	----------	7,056	690	450
Sutter Butte Canal Co.[2]	38.1 R	2-42, 1-26	----------	----------	4,870	6,847	4,525	4,725	815	----------	21,782	1,440	2,730
Sutter Butte Canal Co.[2]	58.1 R	Gravity	2,652	34,320	54,623	35,603	37,276	41,705	33,892	12,712	252,783	16,919	12,270
Western Canal Co.[3]	59.7 R	Gravity	----------	1,694	12,830	14,807	14,006	17,812	4,772	----------	65,921	813	7,091
Totals	----------	----------	2,652	36,440	75,741	60,132	58,418	67,365	41,618	12,980	355,346	22,402	22,541

GUN CLUB DIVERSIONS[4]

Water user	**Mile and bank	Number and size of pump	Monthly diversions in acre-feet				Total diversion, acre-feet
			September	October	November	December	
Western Canal Co.[3]	57.0R	Gravity	5,792	7,510	----------	2,926	16,228

* All Feather River pumps not included in 1924. Many additional pumps listed in succeeding years may have been in operation in 1924.
** Mileage along river above mouth.
[1] Estimated.
[2] Data furnished by Sutter Butte Canal Company.
[3] Data furnished by Western Canal Company.
[4] Diversions for gun clubs in Butte Basin.

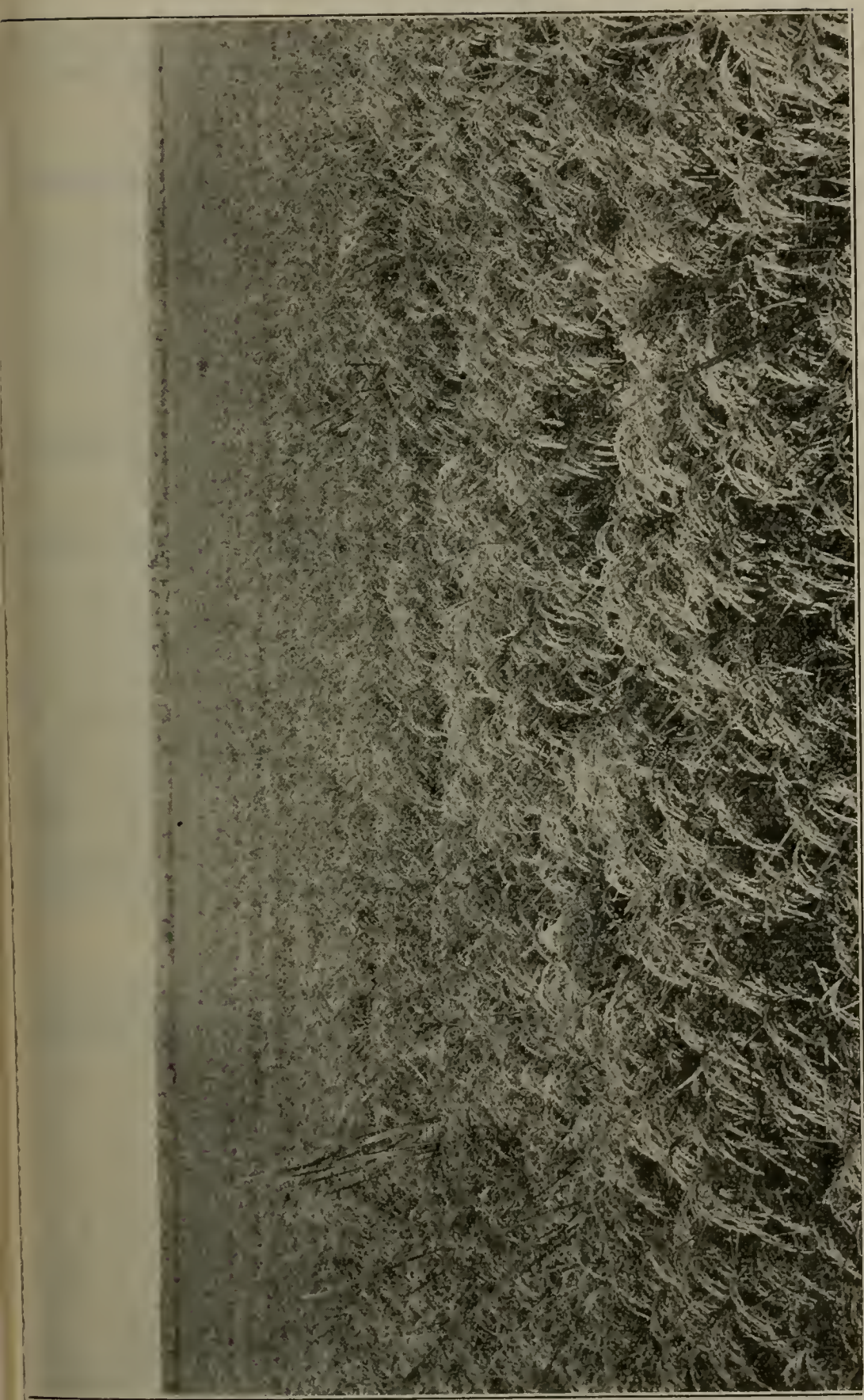

PLATE 4—Field of Rice, Sacramento Valley. The heads are well turned down and the field has just been drained preparatory to harvest.

10—68336

TABLE 81

FEATHER RIVER DIVERSIONS, 1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Robert E. Shields	1.55L	1- 6	----------	27.9	37.1	51.3	31.6	24.1	28	200	70	----------
Sutter Basin Company	2.6 R	1-26, 1-24	----------	----------	----------	1,463	1,620	425	----------	3,508	1,262	----------
R. Catlett	3.13L	1- 8	----------	----------	33.5	17.5	46	2	5	104	70	----------
S. A. McKeehan	5.44L	1- 6	----------	----------	----------	----------	103.6	49.4	5	158	60	----------
M. Scheiber	7.7 L	1- 8	----------	----------	13.3	53.9	35.3	17.4	5.1	125	120	----------
Geo. Pollock[1]	9.75R	1-12, 1-14	----------	----------	59	228	111	44	----------	442	342	----------
Garden Highway Ochard Company	13.1 R	1-20, 1-24	----------	----------	686	1,113	1,135	394	----------	3,328	1,490	----------
Farm Land Investment Company	16.0 L	1-20	----------	475	1,451	1,368	1,448	818	285	5,845	920	500
Alicia Mutual Water Company	24.0 L	1-16	----------	340	1,290	1,542	1,438	831	----------	5,441	680	385
Dr. J. L. Sullivan	33.9 R	1-10	----------	----------	26.1	62.9	47	----------	----------	136	80	----------
Sutter Butte Canal Company	38.1 R	2-24, 1-26	No diversion									
Pacific Highway Orchards Tract (Charles Cottrell)-	43.7 L **H. Sl. 0.4 L	1-18	----------	----------	40	27	----------	24	----------	91	65	----------
Moznett-Wetmore Subdivision No. 1 (Charles St. Claire)	43.7 L **H. Sl. 1.2 L	1-10	----------	14	152	152	55	57	----------	430	240	----------
Manuel A. Barba	43.7 L **H. Sl. 1.25L	1- 8	----------	4	21.8	27	34.7	41.5	----------	129	30	----------
A. P. Barba (John Bettencourt)	47.9 L	1-12	----------	----------	67	32	26	42	----------	167	40	----------
E. F. Biggs (Wm. Luiz)	48.3 L	1-10	----------	----------	35	189	142	62	----------	428	100	----------
J. F. Harriger	51.1 L	1- 7	----------	----------	26	28	24	----------	13	91	63	----------

Silva-Bergtholdt Company	51.6 R	1- 5	----------	8.8	15.4	17.3	6.7	----------	----------	48.2	30	----------
Blower Brothers	52.1 L	1- 9	----------	----------	----------	94	22	22	----------	138	66	----------
H. W. Sealey	52.5 L	1- 6	----------	----------	16.1	24.8	13.6	----------	----------	54.5	72	----------
F. L. Morris	52.7 L	1- 8	----------	----------	38	32	15	6	19	110	40	----------
G. H. Bogue	53.1 R	1- 6	----------	3.6	28.4	14	12	----------	----------	58	25	----------
Hearst Estate	55.1 L	1-14	----------	27	191	162	150	75	----------	605	300	----------
Henry Haselbusch	57.9 R	1- 8	----------	----------	17.2	44.8	4	----------	----------	66	52	----------
Emma C. Eakle	58.1 R	1- 8	----------	----------	7.1	31.8	----------	----------	----------	38.9	35	----------
Sutter Butte Canal Company	58.1 R	Gravity	8,750	58,650	65,970	65,476	58,830	51,652	7,980	317,308	19,097	16,696
Western Canal Company	59.7 R	Gravity	756	11,397	18,735	17,784	15,977	8,809	489	73,947	144	9,153
Ralph Butler	63.7 R	1- 5	----------	----------	----------	12	12	----------	----------	24	[3]67	----------
Totals	----------	----------	9,506	70,947	88,956	90,047	81,340	63,395	8,829	413,020	25,560	26,734

GUN CLUB DIVERSIONS[4]

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet				Total diversions acre-feet
			October	November	December	January	
Western Canal Company	59.7 R	Gravity	2,457	7,946	8,084	2,766	21,253

*Mileage along river above mouth.
**Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7L.
[1] Previously listed as F. Parker.
[2] This acreage includes 30 acresirrigated for E. J. Robinson.
[3] This land also watered from Thermalito Irrigation District System.
[4] Diversions for gun clubs in Butte Basin.

TABLE 82

FEATHER RIVER DIVERSIONS, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Robert E. Shields	1.55L	1- 6	----------	18	59	59	43	15	8	202	165	----------
Sutter Basin Company	2.6 R	1-20, 1-26	----------	----------	532	240	753	90	----------	1,615	745	----------
R. B. Catlett	3.13L	1- 8	No diversion									
S. A. McKeehan	5.44L	1- 6	----------	----------	----------	----------	24	----------	----------	24	20	----------
M. Scheiber	7.7 L	1- 8	----------	----------	----------	45	16	44	5	110	45	----------
George Pollock Company	9.75R	1-12, 1-16	----------	449	212	328	262	----------	----------	1,251	606	----------
Garden Highway Orchard Company	13.1 R	1-20, 1-24	----------	99	1,237	1,696	1,070	534	175	4,811	2,127	----------
Farm Land Investment Company	16.0 L	1-22	168	1,294	1,315	1,365	1,083	684	----------	5,909	1,012	500
Feather River Water Company	16.35R	1-14	----------	----------	72	377	123	----------	----------	572	306	----------
G. C. Shannon[1]	18.75R	1- 6	----------	----------	45	39	10	----------	----------	94	60	----------
Alicia Mutual Water Co.	24.0 L	1-20	----------	818	1,214	1,190	1,149	444	----------	4,815	762	400
Dr. J. L. Sullivan	33.9 R	1-10	----------	----------	89	44	20	35	7	195	80	----------
Sutter Butte Canal Co. (Sunset Plant)	38.1 R	1-26, 2-24	No diversion									
Pacific Highway Orchards Tract (Charles Cottrell)	[2]43.7 L H.Sl. 0.4L	1-18	----------	----------	46	68	49	36	----------	199	65	----------
Moznett-Wetmore Subdivision No. 1 (Charles St. Claire)	[2]43.7 L H.Sl. 1.2L	1-10	----------	14	226	173	160	67	----------	640	203	----------
Manuel A. Barba (J. E. Davis)	[2]43.7 L H.Sl. 1.25L	1- 8	----------	26	24	29	31	26	----------	136	50	----------
A. P. Barba (John Bettencourt)	47.9 L	----------	----------	----------	43	47	35	----------	----------	125	40	----------
E. F. Biggs (Wm. Luiz)	48.3 L	1-10	----------	----------	78	26	67	----------	----------	171	165	----------
J. F. Harriger	51.1 L	1- 7	----------	----------	20	19	29	1	----------	69	[3]74	----------
Silva-Bergtholdt Co.	51.6 R	1- 5	----------	3	7	7	3	----------	----------	20	30	----------
Blower Bros.	52.1 L	1- 9	----------	23	24	41	22	----------	----------	110	95	----------
Gridley Bank of Italy[4] (Sealey Ranch)	52.5 L	1- 6	----------	----------	28	21	----------	----------	----------	[5]49	60	----------
F. L. Morris	52.7 L	1- 8	----------	----------	29	18	15	3	----------	65	40	----------
Frank Dutra[6]	52.9 R	1- 6	----------	----------	----------	12	24	9	----------	45	30	----------

G. H. Bogue	53.1 R	1- 6	----------	8	6	22	6	8	----------	50	20	----------
Budh Singh	54.7 R	1- 8	----------	----------	90	49	22	6	8	175	33	----------
Hearst Estate	55.1 L	1-14	----------	23	214	198	221	15	----------	671	400	----------
L. A. Kister	55.5 L	1- 8	----------	----------	39	51	11	----------	----------	101	130	----------
Rio Bonito Ranch[7]	56.6 R	1-14	----------	----------	----------	148	57	----------	----------	205	45	----------
J. E. Carrico[6]	57.0 R	1- 8	----------	----------	16	24	----------	----------	----------	40	19	----------
Henry Haselbusch	57.9 R	1- 8	----------	16	38	49	15	----------	----------	118	76	----------
Emma C. Eakle (E. A. Switzer)	58.1 R	1- 8	----------	----------	36	30	1	----------	----------	67	55	----------
Sutter Butte Canal Co.	58.1 R	Gravity	14,040	63,820	74,574	73,406	71,514	39,120	3,600	340,074	15,871	22,159
Western Canal Co.	59.7 R	Gravity	2,320	16,686	23,787	25,434	[4]24,788	[10]13,309	280	[9]106,604	116	11,635
Ralph Butler	63.7 R	1- 5	No diversion									
Totals	----------	----------	16,528	83,297	104,100	105,255	101,623	54,446	4,083	469,332	23,545	34,694

*Mileage along river above mouth.

[1] This plant has not been listed heretofore but information obtained is to the effect that it was operated in 1924 and 1925 for the irrigation of the same acreage.

[2] Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7L. Mileage of plant above mouth of Honcut Slough is indicated.

[3] This includes 40 acres irrigated for E. J. Robinson.

[4] Listed heretofore as H. W. Scaley.

[5] Discharge of pump measured but no operation record kept. Gas operated. Periods of operation estimated.

[6] This plant has not been listed heretofore but the owner states that same was in operation in 1925.

[7] This plant has not been listed in previous reports. Information indicates it was operated in 1925 by gasoline motor.

[8] This plant has not been listed heretofore but information indicates same was in operation to about the same extent in 1925 as in 1926.

[9] In addition to diversion here listed, 8,000 acre-feet during the last of October and 5,436 acre-feet up to November 18th were diverted for flooding ponds of duck clubs in Butte Basin.

[10] Diversions given for August and September include 634 acre-feet in August and 2,020 acre-feet in September turned down Butte Creek at the Western Canal crossing to flow thence to the Sacramento River at the junction above Meridian to aid in relieving the water situation on the Sacramento River and in the Delta region.

TABLE 83

FEATHER RIVER DIVERSIONS, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Meyer and Rutz[1]	1.55L	1- 6	----------	7	12	66	22	16	6	129	90	----------
Sutter Basin Company	2.60R	1-20, 1-26	----------	----------	----------	770	1,667	28	----------	2,465	972	----------
R. B. Catlett	3.13L	1- 8	No diversion									
S. A. McKeehan	5.44L	1- 6	No diversion									
M. Scheiber	7.7 L	1- 8	No diversion									
Geo. Pollock Company	9.75R	1-12, 1-16	----------	93	432	435	135	71	129	1,295	828	----------
Garden Highway Mutual Water Company[2]	13.1 R	1-20, 1-24	----------	1,114	1,117	882	966	578	15	4,672	1,577	545
Farm Land Investment Co.	16.0 L	1-22	----------	34	1,499	1,869	1,675	780	159	6,016	1,156	250
Feather River Water Co.	16.35R	1-14	----------	----------	152	324	288	8	----------	772	276	----------
G. C. Shannon	18.75R	1- 6	----------	----------	----------	92	17	----------	----------	109	66	----------
Alicia Mutual Water Co.	24.0 L	1-20, [3]1-16	201	1,805	[4]1,540	2,344	1,386	910	111	[4]8,297	1,166	800
Dr. J. L. Sullivan	33.9 R	1-10	----------	44	54	136	91	----------	----------	325	155	----------
Sutter Butte Canal Company (Sunset Plant)	38.1 R	1-26, 2-24	No diversion									
Pacific Highway Orchards Tract (Charles Cottrell)-	[4]3.7 L H.Sl. 0.4L	1-18	----------	54	124	171	81	41	----------	471	115	----------
Moznett-Wetmore Subdivision No. 1 (Charles St. Claire)	[4]3.7 L H.Sl. 1.2L	1-10	----------	52	98	123	136	39	----------	448	188	----------
Manuel A. Barba (J. E. Davis)	[4]3.7 L H.Sl.1.25L	1- 8	----------	13	25	22	45	6	2	113	56	----------
A. P. Barba (John Bettencourt)	47.9 L	1-12	----------	----------	65	14	47	10	----------	136	75	----------
E. F. Biggs (Wm. Luiz)	48.3 L	1-10	----------	----------	81	183	87	69	----------	420	322	----------
J. F. Harriger	51.1 L	1- 7	----------	----------	73	79	40	26	10	[5]228	[6]83	----------
Silva-Bergtholdt Company	51.6 R	1- 5	----------	----------	----------	7.3	5.9	1.3	----------	14.5	[7]45	----------
Blower Brothers	52.1 L	1- 9	----------	----------	76	31	41	----------	----------	148	120	----------
C. O. Kister[8]	52.5 L	1- 6	----------	----------	20	32	8	----------	----------	60	46	----------
F. L. Morris	52.7 L	1- 8	----------	16	19	18	9	----------	1	63	60	----------

Frank Dutra	52.9 R	1- 6	----------	----------	----------	13.9	7.5	17.6	----------	39	30	--------
G. H. Bogu	53.1 R	1- 6	----------	----------	5	35	11	2	2	55	30	----------
Budh Singh	54.7 R	1- 8	----------	----------	18	80	27	10	----------	135	33	----------
Hearst Estate	55.1 L	1-14	----------	----------	120	217	168	93	----------	598	400	----------
L. A. Kister	55.5 L	1- 8	----------	----------	16	69	29	----------	----------	114	55	----------
Rio Bonito Ranch (M. T. Faria and Co.)	56.6 R	1-14	----------	----------	----------	155	27	----------	----------	182	50	----------
J. E. Carrico	57.0 R	1- 8	----------	6	23	66	8	4	----------	107	35	----------
Henry Haselbusch	57.9 R	1- 8	----------	24	24	46	10	----------	----------	104	62	----------
Emma C. Eakle (E. A. Switzer)	58.1 R	1- 8	----------	10	----------	50	7	----------	----------	67	47	----------
Sutter Butte Canal Company	58.1 R	Gravity	14,755	80,928	82,231	82,987	74,378	56,698	17,678	409,655	16,128	24,896
Western Canal Company	59.7 R	Gravity	2,566	12,258	19,882	22,894	20,832	12,106	556	[10]91,094	678	12,022
Ralph Butler	63.7 R	1- 5	No diversion									
Totals	----------	----------	17,522	96,458	107,706	114,211	102,251	71,514	18,669	528,332	24,944	38,513

*Mileage along river above mouth.
[1] Formerly Robert E. Shields.
[2] Previously listed as Garden Highway Orchard Company.
[3] Additional pump installed 1927.
[4] Prior to June 24th diversions were from Old Yuba River channel by means of "Alicia" plant about one-half mile east of Feather River plant.
[5] Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7L. Mileage of plant above mouth of Honcut Slough is indicated.
[6] Includes 40 acres irrigated for E. J. Robinson.
[7] Includes 15 acres of Ed. Steadman.
[8] Formerly Gridley Bank of Italy (Sealey Ranch).
[9] See correction in 1928 report, footnote.
[10] In addition to diversion here listed, there were diversions by Western Canal for flooding ponds of duck clubs in Butte Basin as follows: (Acre-feet) October 12th to 31st, 5,218; November 1st and 2d, 334; December 1st to 14th, 2,574. Total for duck clubs, 8,126.

TABLE 84

FEATHER RIVER DIVERSIONS, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Meyer and Rutz	1.55L	I- 6	----------	12	57	32	31	32	4	168	74	----------
Sutter Basin Company	2.60R	1-20, I-26	----------	----------	10	595	979	----------	----------	1,584	608	----------
R. B. Catlett	3.13L	I- 8	No diversion									
S. A. McKeehan	5.44L	I- 6	----------	----------	5.2	7	6.6	3.7	0.8	23.3	10	----------
M. Scheiber	7.70L	I- 8	----------	----------	2	92	92	74	----------	260	60	----------
Geo. Pollock Company (Spreckels Sugar Co.)	9.75R	I-12, I-16	----------	45	393	470	155	112	83	1,258	933	----------
Garden Highway Mutual Water Company	13.1 R	1-20, I-24	230	880	1,837	1,787	1,535	594	----------	6,863	[1]1,306	366
Plumas Mutual Water Co.[2]	16.0 L	1-22	----------	----------	1,516	2,198	2,275	----------	----------	5,989	917	300
Feather River Water Company	16.35R	I-14	----------	158	174	226	132	----------	----------	690	275	----------
G. C. Shannon	18.75R	I- 6	----------	----------	60	51	39	----------	----------	150	80	----------
Alicia Mutual Water Company	24.0 L	1-20, I-16	----------	1,169	1,808	1,881	1,510	396	----------	[2]6,764	645	650
J. L. Sullivan	33.9 R	1-10	----------	70	193	192	68	----------	----------	523	150	----------
Sutter Butte Canal Co. (Sunset Plant)	38.1 R	2-42, 1-26	No diversion									
Pacific Highway Orchards Tract (Charles Cottrell)	[4]43.7 L H.Sl. 0.4L	I-18	----------	----------	74	43	19	8	----------	144	60	----------
Moznett-Wetmore Subdivision No. 1 (Charles St. Claire)	[4]43.7 L H.Sl. 1.2L	1-10	----------	100	147	154	91	32	4	528	181	----------
Manuel A. Barba (J. E. Davis)	[4]43.7 L H.Sl.1.25L	I- 8	----------	3	14	15	19	13	----------	64	30	----------
A. P. Barba (John Bettencourt)	47.9 L	1-12	----------	----------	80	----------	53	4	----------	137	60	----------
E. F. Biggs (Wm. Luiz)	48.3 L	1-10	----------	3	124	149	130	----------	----------	406	300	----------
J. F. Harriger[6]	51.1 L	1- 7	----------	12	38	24	31	12	----------	[3]117	[6]70	----------
Donald Steadman[7]	51.4 R	1-10	----------	----------	----------	51	56	----------	----------	107	40	----------
Silva-Bergtholdt	51.6 R	1- 5	----------	----------	9	----------	7	----------	----------	16	25	----------
Blower Bros.	52.1 L	I- 9	----------	46	41	30	37	16	----------	170	124	----------
C. O. Kister	52.5 L	1- 6	----------	13	22	20	10	13	----------	78	46	----------
F. L. Morris	52.7 L	1- 8	----------	10	26	32	6	----------	2	76	75	----------
Frank Dutra	52.9 R	1- 6	----------	----------	----------	11	23	16	6	56	40	----------
G. H. Bogue	53.1 R	1- 6	----------	2	25	13	17	3	----------	60	40	----------
Budh Singh	54.7 R	1- 8	----------	----------	52	27	42	15	----------	136	50	----------

Hearst Estate (Sunical Packing Company)	55.1 L	1-14	----------	----------	221	217	252	32	----------	722	400	----------
L. A. Kister	55.5 L	1- 8	----------	----------	53	47	----------	----------	----------	100	48	----------
Rio Bonito Ranch	56.6 R	1-14	----------	----------	133	67	64	30	----------	294	85	----------
J. E. Carrico	57.0 R	1- 8	----------	----------	----------	33	4	12	----------	49	8	----------
Henry Haselbusch	57.9 R	1- 8	----------	5	21	39	8	----------	----------	73	65	----------
Emma C. Eakle (E. A. Switzer)	58.1 R	1- 8	No diversion									
Sutter Butte Canal Company	58.1 R	Gravity	19,013	84,717	83,619	76,239	70,572	39,664	11,900	385,724	16,035	22,008
Western Canal Company	59.7 R	Gravity	669	14,410	19,121	19,617	19,189	5,904	40	[8]78,950	543	9,821
Ralph Butler	63.7 R	1- 5	No diversion									
Totals	----------	----------	19,912	101,655	109,875	104,359	97,452	46,986	12,040	492,279	23,383	33,145

*Mileage long river above mouth.
[1] Includes 339 of Brown and Purington.
[2] Formerly Farm Land Investment Company.
[3] Prior to May 19th diversions were from Old Yuba River channel by means of "Alicia" plant, about one-half mile east of Feather River plant.
[4] Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7L. Mileage of plant above mouth of Honcut Slough is indicated.
[5] Through error the diversions for this plant were wrongly given in the 1927 report. The correct 1927 diversions were: (Acre-feet) June, 45; July, 50; August, 25; September, 16 and October, 6. Total 142.
[6] Includes 20 acres irrigated for E. J. Robinson.
[7] New installation 1928.
[8] In addition to diversions here listed there were diversions by Western Canal for flooding ponds of duck clubs in Butte Basin as follows: (Acre-feet) September 1,279, October, 7,343, November, 6,653, December, 6,958; Total 22,233.

TABLE 85

*YUBA RIVER DIVERSIONS, 1925

Water user	**Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	†Acreage irrigated
			April	May	June	July	August	September	October		
Marysville River Farms Co. (Plant No. 3)	2.8L	1-12	----------	131.7	353.7	281.7	3.7	----------	----------	770.8	270
Howard Reed Orchard Company	4.2L	1-10	----------	----------	214	48	276	165	----------	703	300
Marysville River Farms Co. (Plant No. 2)	5.2L	1- 8	----------	70	111.5	91.5	----------	----------	----------	273	80
Marysville River Farms Co. (Plant Nos. 1 and 1 Auxiliary)	6.6L	1-12, 1-10	----------	270.5	643	564.2	270.7	83.6	14	1,846	886
Marysville River Farms Co. (Plant Nos. 4 and 5)	7.5L	1-10, 1- 7	----------	144.6	272	----------	35.4	----------	----------	452	260
Totals	----------	----------	----------	617	1,594	985	586	249	14	4,045	1,796

*All Yuba diversions were not included in 1925. Additional diversions listed in later years may have been in operation in 1925 and previous years.
**Approximate mileage along river above highway crossing at Marysville.
†All general crops. No rice.

TABLE 86

YUBA RIVER DIVERSIONS, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Marysville River Farms Co. (Plant No. 3)	2.8L	1-12	----------	30	163	181	21	13	----------	408	225	----------
Howard Reed Orchard Co.	4.2L	1-10	----------	1	185	125	153	38	----------	502	210	----------
Howard Reed Orchard Co.[1]	5.2L	1-10	----------	----------	----------	45	----------	----------	----------	45	[1]90	----------
Marysville River Farms Co.[2] (Plant No. 1)	6.5L	1-12	----------	----------	202	271	261	166	----------	900	207	----------
Marysville River Farms Co.[3] (Plant No. 4)	7.5L	[4]1-10	No diversion								([3])	
Hallwood Irrigation Co. and Cordua Irrigation District[5]	11.0R	Gravity	----------	4,650	6,275	8,271	10,350	4,387	120	34,053	[5]2,502	[5]3,279
Totals	----------	----------	----------	4,681	6,825	8,893	10,785	4,604	120	35,908	3,234	3,279

*Approximate mileage along river above highway crossing at Marysville.

[1] This plant is at the location previously listed as Marysville River Farms Co. Plant No. 2. The plant used in 1925 has been dismantled. In 1926 the 10 in. pump from Marysville River Farms Co. Plant No. 4, Mile 7.5L was installed at Mile 5.2L and used for the irrigation of 90 acres by Peter Carli under lease from Marysville River Farms Co. Later in the season the pump was returned to the location at Mile 7.5L and an attempt was made to irrigate 275 acres here. This was unsuccessful due to a shifting of the river channel. Subsequently to the irrigation by Carli from the plant at Mile 5.2L the land under this plant was sold to Howard Reed Orchard Company.

[2] Number 1 Auxiliary Plant, 10 in. listed in 1925, was removed and not again installed in 1926.

[3] An attempt to use this plant for irrigation of 275 acres was unsuccessful due to a shifting of the river channel. See footnote for plant at Mile 5.2L.

[4] The 7 in. pump previously listed for this location was removed in 1926.

[5] Hallwood Irrigation Company and Cordua Irrigation District have a common point of diversion and common canal for about one-half mile; diversion and acreage figures are for combined projects. Irrigated acreage is segregated as follows: Hallwood, Rice 1,494, General 2,351; Cordua, Rice 1,785, General 151.

TABLE 87

YUBA RIVER DIVERSIONS, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Marysville River Farms Co. (Plant No. 3)	2.8L	1-12	----------	----------	62	94	93	23	----------	272	188	----------
Dantoni Orchards[1]	4.2L	1-10	----------	----------	----------	6	67	----------	----------	73	90	----------
Wm. W. Dinsmore[2]	4.5L	1- 6	----------	6.9	9.3	6.9	6.9	----------	----------	30	[5]56	----------
Dantoni Orchards[1]	5.2L	[4]1- 8	----------	----------	----------	29	43	----------	----------	72	100	----------
Marysville River Farms Co. (Plant No. 1)	6.6L	1-12	104	135	----------	282	273	27	----------	821	127	----------
Marysville River Farms Co. (Plant No. 4)	7.5L	1-10	No diversion									
Hallwood Irrigation Co. and Cordua Irrigation District	11.0R	Gravity	200	6,350	9,690	9,390	8,250	4,170	432	38,482	[5]3,442	[5]1,930
Totals	----------	----------	304	6,492	9,761	9,808	8,733	4,220	432	39,750	4,003	1,930

*Approximate mileage along river above highway crossing at Marysville.

[1] Formerly Howard Reed Orchard Company.

[2] New installation 1927.

[3] Owner states that his lands were irrigated in previous years from Howard Reed Orchard Company plant, Mile 4.2L, as follows: 1924, 45 acres; 1925, 25 acres; 1926, 25 acres.

[4] Former plant dismantled. New plant 1927.

[5] Hallwood Irrigation Company and Cordua Irrigation District have a common point of diversion and common canal for about one-half mile; diversion and acreage figures are for combined projects. Irrigated acreage is segregated as follows: Hallwood, rice 700, general 3,230; Cordua, rice 1,230, General 212.

TABLE 88

YUBA RIVER DIVERSIONS, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated	
			April	May	June	July	August	September	October		General	Rice
Marysville River Farms Co. (Unit No. 10 Plant)	2.8L	1-12	No diversion									
Dantoni Orchards	4.2L	1-10	No diversion									
Wm. W. Dinsmore	4.5L	1- 6	----------	10	2	2	----------	----------	----------	14	35	----------
Dantoni Orchards	5.2L	1- 8	----------	----------	48	11	38	----------	----------	97	60	----------
Marysville River Farms Co. (Unit No. 8 Plant)	6.6L	1-12	----------	----------	----------	239	165	----------	----------	404	400	----------
Marysville River Farms Co. (Plant No. 4)	7.5L	1-10	Plant removed									
Hallwood Irrigation Co. and Cordua Irrigation District	11.0R	Gravity	----------	7,319	8,709	9,399	8,613	2,245	----------	36,285	[1]4,440	[1]1,875
Totals	----------	----------	----------	7,329	8,759	9,651	8,816	2,245	----------	36,800	4,935	1,875

*Approximate mileage along river above highway crossing at Marysville.

[1] Hallwood Irrigation Company and Cordua Irrigation District have a common point of diversion and common canal for about one-half mile; diversion and acreage figures are for combined projects. Irrigated acreage is segregated as follows: Hallwood, rice 400, General 4,300; Cordua, rice 1,475, General 140.

TABLE 89

AMERICAN RIVER DIVERSIONS, 1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
G. A. Meister	3. 2L	1-10	48.7	23.3	18.4	33.6	23.2	4.8	4.0	156.0	[4]80
G. A. Meister	3. 8L	1-10	----------	----------	32.4	85.6	39.2	28.8	----------	186.0	[4]90
C. Swanston and Sons (Spreckels Sugar Co.)	5. 2R	1-10	----------	43.0	70.0	----------	----------	----------	----------	113.0	150
Mardsen	5. 6L	1- 3	4.0	5.0	4.0	4.0	4.0	4.0	4.0	29.0	10
E. Clemens Horst Co.	6. 0R	1- 8	----------	----------	42.8	148.8	72.0	33.0	18.0	314.6	60
Cutter Brothers	6. 8L	1- 5	----------	4.7	23.4	11.4	14.6	8.1	7.9	70.1	30
S. H. Cowell	7. 1L	1- 7	----------	----------	13.1	14.9	20.8	3.1	13.3	65.2	30
E. Clemens Horst Co.	7. 5R	1- 8	----------	----------	28.0	84.6	42.6	----------	----------	155.2	96
Edward Morinini	7. 9R	1- 8	----------	----------	----------	118.8	80.4	55.8	3.0	258.0	120
Glaeken, Dwyer and Stevens (Pioneer Fruit Co.)	8. 1L	1- 8	----------	----------	98.7	2.3	----------	----------	----------	101.0	35
P. M. Rooney	8. 6L	1- 6	No diversion								
Edward Morinini	8. 7R	1- 8	----------	----------	----------	10.6	68.4	----------	----------	79.0	60
Harding Brothers	9. 0L	1- 5	----------	----------	----------	12.3	----------	----------	----------	12.3	[2]34
A. F. Counsman	9. 2L	1- 8	----------	----------	----------	30.6	60.3	10.1	----------	101.0	[2]133
C. E. Wells	9.45L	1- 5	----------	----------	----------	19.6	----------	----------	----------	19.6	[3]50
C. E. Wells	9. 5L	1- 8	----------	----------	----------	29.7	20.4	----------	----------	50.1	([3])
Henry Cowell (M. N. Williamson)	9. 9L	1- 5	----------	----------	8.0	7.0	11.0	----------	----------	26.0	45
Gibbens and Richardson	10. 2R	1-10	----------	11.0	----------	----------	15 0	----------	----------	26.0	72
H. W. Bartell	10. 3L	1-20	----------	69	205	182	48	----------	----------	504	106
Del Paso Hop Co.	10. 5R	1-10	----------	----------	----------	36.0	25.0	39.7	23.3	124.0	60
Annie Hoey	11. 2L	1- 8	----------	----------	----------	5.5	10.5	----------	----------	16.0	5
J. T. Gore Estate (C. E. Wells)	11. 5L	1- 6	----------	----------	----------	8.0	----------	----------	----------	8.0	46
Wm. A. Meyer	11. 7L	1- 4	----------	4.0	12.0	12.7	----------	----------	5.2	33.9	25
Annie Hoey	11. 8L	1- 5	No diversion								
Spreckels Sugar Co.	12. 6R	1-12	----------	95.0	90.0	----------	----------	----------	----------	185.0	288
Mary Deterding	13. 9R	1- 3, 1- 4	----------	----------	16.2	60.4	12.8	20.4	12.5	122.3	90
Carmichael Irrigation District	16. 0R	1-6, 1-8, 1-12	13.0	6.0	321.4	309.5	627.3	248.8	51.2	1,577	1,777
Wm. H. Devlin	17. 1R	1- 2, 1- 6	----------	0.09	1.71	4.91	2.29	1.00	----------	10.00	18
Totals	----------	----------	66	261	985	1,233	1,198	458	142	4,343	3,510

* Mileage along river above mouth.
** All general crops. No rice.
[1] Includes 30 acres irrigated for P. M. Rooney.
[2] Includes 41 acres irrigated for Harding Brothers.
[3] Area served by both plants. Mile 9.45L and 9.5L.
[4] See correction in 1928 report, footnote.
NOTE—In 1924 only diversions below H street bridge, Sacramento, were listed, see Meister and Mardsen diversions, Table 111.

TABLE 90

AMERICAN RIVER DIVERSIONS, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
G. A. Meister	3.2L	1-10	5	8	27	15	30	17	----	102	[1]177
G. A. Meister	3.6L	1- 4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
G. A. Meister	3.8L	1-10	----	3	48	67	53	24	16	211	[2]
E. Clemens Horst Co.	6.0R	1- 8	----	----	43	55	14	20	8	140	98
Cutter Brothers	6.8L	1- 5	----	4	6	----	9	6	2	27	30
S. H. Cowell	7.1L	1- 7	----	20	53	57	23	24	6	183	50
E. Clemens Horst Co.	7.5R	1- 8	----	----	43	66	----	----	----	109	95
Edward Morinini	7.9R	1- 8	----	----	44	104	52	56	----	256	77
Glacken-Dwyer-Stevens (Pioneer Fruit Co.)	8.1L	1- 8	No diversion								
P. M. Rooney	8.6L	1- 8	----	----	51	----	----	----	----	51	38
Edward Morinini	8.7R	1- 8	----	----	37	62	30	30	----	159	40
M. T. Harding Ranch[3]	9.0L	[4]1- 7	----	----	6	12	----	1	----	19	42
A. F. Counsman	9.2L	1- 8	----	----	41	17	15	----	----	73	86
C. E. Wells	9.45L	1- 5	----	----	12	20	----	----	----	32	[5]50
C. E. Wells	9.5L	1- 8	----	----	39	36	----	----	----	75	([6])
Henry Cowell (M. N. Williamson)	9.9L	1- 5	----	----	16	62	8	----	----	86	50
Gibbens and Richardson	10.2R	1- 8	----	----	18	16	----	----	----	34	72
H. W. Bartell	10.3L	1-20	----	238	----	230	----	----	----	468	100
Del Paso Hop Co.	10.5R	1-10	----	----	70	42	42	32	5	191	80
Annie Hoey (Home Ranch)	11.2L	1- 8	No diversion								
J. T. Gore Estate (C. E. Wells)	11.5L	1- 6	No diversion								
Wm. A. Meyer	11.7L	1- 4	----	2	16	8	1	6	----	33	31
Annie Hoey (Land Ranch)	11.8L	1- 5	No diversion								
Haggin Bottom Land Co.[7] (Chan Bow)	12.6R	1-10	No diversion								
Mary Deterding[8]	13.9R	1- 6	----	18	20	22	21	17	3	101	[9]171
Mary Deterding	14.7R	1- 3	No diversion								
Mary Deterding	15.1R	1- 4	----	----	----	7	4	7	1	19	([10])
Carmichael Irrigation District	16.0R	1-8, 1-6, 1-12	----	95	563	619	585	240	115	2,217	1,763
Wm. H. Devlin	17.1R	1-6, 1- 2	----	2	8	1	7	----	----	18	23
Totals	----	----	5	390	1,162	1,519	894	480	156	4,606	3,073

* Mileage along river above mouth.
** All general crops. No rice.
[1] This is the combined acreage irrigated by pumps at Miles 3.2L and 3.8L. See correction in 1928 report, footnote.
[2] See plant at Mile 3.2L.
[3] Listed heretofore as Harding Brothers.
[4] Former pump replaced by 7'' in 1926 at new location 500 feet upstream.
[5] Combined acreage irrigated from plants at 9.45L and 9.5L.
[6] See plant at Mile 9.45L.
[7] Listed heretofore as Spreckels Sugar Company. The latter company was lessee in 1925.
[8] Previous to 1926 this diversion comprised two pumps at one location, Mile 13.9R. These were one 3'' and one 4''. In 1926 the 3'' pump was moved to Mile 14.7R, the 4'' pump to Mile 15.1R and a new 6'' pump was installed at Mile 13.9R.
[9] This is the total acreage irrigated from pumps at Miles 13.9R and 15.1R.
[10] See plant at Mile 13.9R.

AMERICAN RIVER DIVERSIONS, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
G. A. Meister	3.2 L	1-10	----------	10	16	20	22	8	----------	76	[1]177
G. A. Meister	3.6 L	1- 4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
G. A. Meister	3.8 L	1-10	2	19	26	48	34	----------	----------	129	[2]
C. Swanston and Son (W. Idemoto)[3]	5.2 R	1- 4	----------	2.3	2.7	7.3	8.5	12.5	2.9	36.2	10
E. Clemens Horst Company	6.0 R	1- 8	----------	----------	----------	71	15	----------	18	104	80
Cutter Brothers	6.8 L	1- 5	----------	----------	17	7	7	15	----------	46	30
S. H. Cowell	7.1 L	1- 7	----------	16	----------	81	137	22	----------	256	70
E. Clemens Horst Company	7.5 R	1- 8	----------	----------	----------	100	54	----------	----------	154	124
Edward Morinini	7.9 R	1- 8	----------	----------	3	109	108	16	----------	236	77
Glacken-Dwyer-Stevens (Pioneer Fruit Company)[4]	8.1 L	----------	No diversion								
P. M. Rooney	8.6 L	1- 8	----------	1.5	39.3	----------	----------	----------	----------	40.8	38
Edward Morinini	8.7 R	1- 8	----------	----------	2	70	116	45	----------	233	40
M. T. Harding Ranch	9.0 L	1- 7	----------	9.2	13.2	11.2	6.2	----------	----------	39.8	42
A. F. Counsman (Nelson)	9.2 L	1- 8	----------	----------	17	35.9	8.3	----------	----------	61.2	86
C. E. Wells	9.45L	1- 5	----------	----------	1.3	16.2	----------	----------	----------	17.5	[5]50
C. E. Wells	9.5 L	1- 8	----------	----------	3.2	42.8	----------	----------	----------	46	[6]
Henry Cowell (M. N. Williamson)	9.9 L	1- 5	----------	----------	----------	58.7	----------	----------	----------	58.7	50
Gibbens and Richardson	10.2 R	1- 8	----------	----------	4.1	38.8	----------	----------	----------	42.9	72
H. W. Bartell	10.3 L	1-20	----------	93	118	----------	130	----------	----------	341	75
E. H. Gerber (Gold Nugget Orchard Company)[7]	10.4 R	1- 5	----------	----------	4.7	39	13.1	3.4	----------	60.2	60
Del Paso Hop Company	10.5 R	1-10	----------	----------	----------	34	24	23	15	96	40
Annie Hoey (Howe Ranch)	11.2 L	1- 8	----------	----------	72	2	12	----------	----------	86	60
J. T. Gore Estate (C. E. Wells)	11.5 L	1- 6	No diversion								
Wm. A. Meyer	11.7 L	1- 4	----------	----------	16	15	18	----------	----------	49	31
Annie Hoey (Land Ranch)	11.8 L	1- 5	No diversion								
Haggin Bottom Land Company	12.6 R	1-10	No diversion								
P. Osterle[8]	13.2 R	1- 4	----------	----------	----------	----------	16	----------	----------	16	49
Mary Deterding	13.9 R	1- 6	----------	0.1	24	8.5	4.1	2.3	2	41	[9]252
Mary Deterding	14.7 R	1- 3	No diversion								
Mary Deterding	15.1 R	1- 4	----------	2.2	1.6	13.4	7.7	13.5	6.3	44.7	[9]
Carmichael Irrigation District	16.0 R	1-12, 1-8, 1-6	14	162	643	918	829	367	364	3,297	1,807
Wm. H. Devlin	17.1 R	1-6, [10]1-1¼	----------	1.4	3.7	7.3	6.3	1.1	1.1	20.9	23
Totals	----------	----------	16	317	1,028	1,754	1,577	529	410	5,631	3,343

*Mileage along river above mouth.

**All general crops. No rice.

[1] This is the combined acreage irrigated by pumps at miles 3.2L and 3.8L. See correction in 1928 report, footnote.

[2] See plant at Mile 3.2L.

[3] New installation 1927. Plant operated here in 1925 was dismantled. No plant in 1926.

[4] River pump abandoned. Irrigation now from well.

[5] Combined acreage irrigated from plants at 9.45L and 9.5L.

[6] See plant at Mile 9.45L.

[7] New installation 1927.

[8] This plant has not been listed prior to 1927, but owner states it operated for the irrigation of the same acreage in previous years as follows: 1923 (6 in. pump) 288 hours; 1924, (4 in. and 6 in. pumps) 288 hours; 1925, (4 in. pump) 288 hours; 1926, (4 in. pump) 300 hours.

[9] This is the total acreage irrigated from pumps at 13.9R and 15.1R.

[10] Former 2 in. pump replaced by 1¼ in. in 1927.

TABLE 92

AMERICAN RIVER DIVERSIONS, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	**Acreage irrigated
			April	May	June	July	August	September	October		
G. A. Meister	3.2 L	1-10	----------	5	65	69	64	60	28	291	[1]238
G. A. Meister	3.6 L	1- 4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
G. A. Meister	3.8 L	1-10	----------	----------	21	32	19	8	2	82	([2])
C. Swanston and Son	5.2 R	1- 4	Plant removed								
E. Clemens Horst Company	6.0 R	1- 8	----------	----------	54	47	16	----------	----------	117	78
Cutter Brothers	6.8 L	1- 5	----------	3	12	----------	4	4	----------	23	[3]87
S. H. Cowell	7.1 L	1- 7	----------	----------	27	76	35	92	----------	230	75
E. Clemens Horst Company	7.5 R	1- 8	----------	----------	----------	72	11	----------	----------	83	100
Kiyoshi Okomoto[4]	7.9 R	1- 8	----------	----------	----------	12	8	14	----------	34	14
P. M. Rooney	8.6 L	1- 8	----------	----------	68	----------	----------	----------	----------	68	38
Edward Morinini	8.7 R	1- 8	----------	----------	----------	7	24	13	6	50	65
M. T. Harding	9.0 L	1- 7	----------	----------	26	11	----------	----------	----------	37	45
A. F. Cousman (Nelson	9.2 L	1- 8	----------	----------	----------	28	2	----------	----------	30	40
C. E. Wells	9.45L	1- 5	----------	----------	11	6	7	----------	----------	24	[5]40
C. E. Wells	9.5 L	1- 8	----------	----------	28	8	----------	----------	----------	36	([6])
Henry Cowell (Quong Ham)	9.9 L	1- 5	----------	----------	15	32	----------	----------	----------	47	40
Gibbens and Richardson	10.2 R	1- 8	----------	----------	6	26	2	----------	----------	34	76
H. W. Bartell	10.3 L	1-20	----------	----------	224	----------	----------	----------	----------	[7]224	[7]200
E. H. Gerber (Gold Nugget Orchard Company)	10.4 R	1- 5	Plant removed								
Del Paso Hop Company	10.5 R	1-10	No diversion								
Annie Hoey	11.2 L	1- 8	No diversion								
J. T. Gore Estate (C. E. Wells)	11.5 L	1- 6	No diversion								
Wm. A. Meyer	11.7 L	1- 4	----------	7	11	9	3	----------	3	33	29
Harry Nakatoni[8]	[10]11.7 L	1- 5	----------	----------	11	32	----------	----------	----------	43	20
Haggin Bottom Land Company	12.6 R	1-10	Plant removed								
P. Osterle	13.2 R	1- 4	----------	----------	----------	----------	19	----------	----------	19	20
Mary Deterding	13.9 R	1- 6	----------	----------	4.6	2.1	----------	----------	----------	6.7	27
Mary Deterding	14.7 R	1- 3	No diversion								
Mary Deterding	15.1 R	1- 4	No diversion								
Carmichael Irrigation District	16 0 R	1-12, 1-8, 1-6	121	563	820	791	750	639	416	4,100	1,837
Wm. H. Devlin	17.1 R	1-6, 1-1¼	----------	1.8	2.1	2.2	0.4	2.1	2.2	10.8	[9]2
Totals	----------	----------	121	580	1,406	1,263	965	832	458	5,625	3,071

*Mileage along river above mouth.

**All general crops. No rice.

[1] This is the combined acreage for pumps at 3.2L and 3.8L. Note that the acreage irrigated has been reported erroneously in previous reports. The correct figures for the combined acreage are as follows: 1924, 200; 1925, 240; 1926, 240; 1927, 240; and 1928, 238.

[2] See plant at Mile 3.2L.

[3] The water from river pump and that from wells was commingled in the irrigation of this

[4] Formerly Edward Morinini.

[5] Combined acreage irrigated from plants at 9.45L and 9.5L.

[6] See plant at mile 9.45L.

[7] Some additional water for this acreage was derived from wells. However, river pump will serve about 240 acres.

[8] Formerly Annie Hoey (Land Ranch).

[9] Gardens and domestic.

[10] Moved from former location.

TABLE 93

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1924

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion March to October, acre-feet	Acreage irrigated
			March	April	May	June	July	August	September	October		
East Contra Costa Irrigation Co.**	36.5 L	2-30, 1-18, 1-24	2,650	4,070	3,640	3,680	2,910	2,930	1,570	421	21,871	[1]5,156, [2]4,056, [3]1,044
Byron-Bethany Irrigation District	40.9 L	1-26, 1-30	2,700	1,450	3,860	3,740	4,270	3,050	2,250	429	21,749	7,500
West Side Irrigation District	47.65L	7-15	4,400	3,830	4,200	4,040	4,180	3,930	3,820	1,900	30,300	8,834
Naglee-Burk Irrigation District	50.4 L	1-16, 1-18	570	961	900	974	1,100	935	637	883	6,960	2,600
Totals			10,320	10,311	12,600	12,434	12,460	10,845	8,277	3,633	80,880	29,190

*Distance along the river from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15.
**Water diverted and delivered by East Contra Costa Irrigation Co. to the three Irrigation Districts—[1]Brentwood Irrigation District, [2]Knightsen Irrigation District, [3] Lone Tree Irrigation District.

TABLE 94

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
East Contra Costa Irrigation Company [1]	[3]36.5 L	2-30, 1-24, 1-18	127	1,174	3,642	4,962	3,965	2,247	432	16,549	[2]12,000
Byron-Bethany Irrigation District	[4]40.9 L	1-26, 1-30	----------	1,050	3,627	4,094	3,441	1,857	118	14,187	9,000
West Side Irrigation District	[5]47.65L	7-15	1,610	4,452	4,651	5,887	5,648	4,247	1,797	28,292	11,077
Naglee-Burk Irrigation District	50.4 L	1-16, 1-18	----------	654	1,313	1,321	908	1,053	----------	5,249	2,600
Totals			1,737	7,330	13,233	16,264	13,962	9,404	2,347	64,277	34,677

* Distance along the river from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15.
[1] The diversions by this company are for the Brentwood, Knightsen and Lone Tree Irrigation Districts.
[2] Combined area irrigated by Brentwood, Knightsen and Lone Tree Irrigation Districts.
[3] To junction of Old River and Indian Slough. Pumping plant is located 2½ miles west along Indian Slough.
[4] To junction of Old River and Italian Slough. Pumping plant is located 2¾ miles southwest along Italian Slough and extension cut.
[5] To junction of Old River with intake cut. Pumping plant is located one mile south along intake cut.

TABLE 95

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
East Contra Costa Irrigation District[1]	[2]36.5 L	2-30, 1-24, 1-18	493	4,233	5,422	5,223	5,039	3,823	706	24,939	14,800
Byron-Bethany Irrigation District	[2]40.9 L	1-26, 1-30	1,368	4,029	4,685	4,406	3,180	2,665	243	20,576	8,976
West Side Irrigation District	[4]47.65L	7-15	2,471	6,030	6,212	6,119	6,068	5,022	1,080	33,002	11,104
Naglee-Burk Irrigation District	50.4 L	1-18, 1-16	108	1,234	1,101	942	996	866	122	5,369	2,600
Totals			4,440	15,526	17,420	16,690	15,283	12,376	2,151	83,886	37,480

* Distance along the river from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15.
[1] Formerly East Contra Costa Irrigation Company pumping water to Brentwood, Knightsen and Lone Tree Irrigation Districts, now combined into one district.
[2] To junction of Old River and Indian Slough. Pumping plant is located 2½ miles west along Indian Slough.
[3] To junction of Old River and Italian Slough. Pumping plant is located 2¾ miles southwest along Italian Slough and extension cut.
[4] To junction of Old River with intake cut. Pumping plant is located one mile south along intake cut.

TABLE 96

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion March to October, acre-feet	Acreage irrigated
			March	April	May	June	July	August	September	October		
East Contra Costa Irrigation District	[1]36.5 L	2-30, 1-24, 1-18	----------	343	4,972	5,424	4,628	4,477	3,015	1,507	24,366	[2]14,000
Byron-Bethany Irrigation District	[2]40.9 L	1-26, 1-30	----------	----------	4,492	3,235	3,850	3,014	1,989	157	16,737	[2]9,000
West Side Irrigation District	[3]47.65L	7-15	80	1,466	5,683	5,102	5,045	4,151	3,478	743	25,748	10,416
N. E. and John Welty (T. B. Silva)[4]	48 7 L	1- 8	----------	6	17	12	6	----------	25	----------	66	79
Naglee-Burke Irrigation District	50.4 L	1-18, 1-16	----------	----------	1,148	985	723	1,009	890	97	4,852	1,856
Totals			80	1,815	16,312	14,758	14,252	12,651	9,398	2,504	71,769	35,351

* Distance along the river from its mouth 4½ miles below Antioch. Mileage as established by War Department survey of 1913-15.
[1] To junction of Old River and Indian Slough. Pumping plant is located 2½ miles west along Indian Slough.
[2] Approximately. Exact area not determined by district.
[3] To junction of Old River and Italian Slough. Pumping plant is located 2¾ miles southwest along Italian Slough and extension cut.
[4] To junction of Old River with intake cut. Pumping plant is located one mile south along intake cut.
[illegible] was obtained to the effect that it was operated in 1926 for the same area [illegible] not operated 1924 or 1925 [illegible] operated prior to 1924.

TABLE 97

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
East Contra Costa Irrigation District	[1]36.5 L	2-30, 1-24, 1-18	1,519	6,827	6,350	5,830	5,003	3,128	1,291	29,948	15,160
Byron-Bethany Irrigation District	[2]40.9 L	1-26, 1-30	335	4,177	3,426	3,376	3,556	1,640	264	16,774	10,500
Joe F. Costa[3]	45.2 L	1- 8	----------	15	20	4	11	6	7	63	50
E. H. Stevenson (Ray Brothers)[3]	45.8 L	1-12	24	----------	55	27	52	18	7	183	70
H. Lindeman[3]	47.2 L	1-12	82	172	122	144	122	107	92	841	300
West Side Irrigation District	[4]47.65L	7-15	1,298	4,370	3,464	3,544	3,392	3,073	917	20,058	10,699
N. E. and John Welty (T. B. Silva)	48.7 L	1- 8	----------	26	24	29	29	9	----------	117	70
Naglee-Burke Irrigation District	50.4 L	1-18, 1-16	172	1,234	1,202	1,173	1,148	1,031	82	[5]6,042	[6]2,057
Freemont Irrigation Association[7]	50.9 L	1-14	----------	74	374	313	353	137	19	1,270	900
Labrucherie, Platti and Smallpage[7]	52.4 L	1-10	----------	----------	----------	86	35	36	----------	157	118
Totals	----------	----------	3,430	16,895	15,037	14,526	13,701	9,185	2,679	75,453	39,924

* Distance along the river from its mouth 4½ miles below Antioch. Mileage as established by War Department survey of 1913-15.
[1] To junction of Old River and Indian Slough. Pumping plant is located 2½ miles west along Indian Slough.
[2] To junction of Old River and Italian Slough. Pumping plant is located 2¾ miles southwest along Italian Slough and extension cut.
[3] Reported for first time in 1928. Has probably operated in previous years.
[4] To junction of Old River with intake cut. Pumping plant is located one mile south along intake cut.
[5] 64 acre-feet additional were diverted in March.
[6] Includes 107 acres of rice.
[7] New installation 1928.

TABLE 98

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1924

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion March to October, acre-feet	Acreage irrigated
			March	April	May	June	July	August	September	October		
Valley Land and Sugar Co.	0.7S	1-20	658	1,150	1,470	1,740	1,360	1,210	446	353	8,387	1,500
Alameda Sugar Co.	2.1S	1-12	----------	----------	----------	----------	----------	**400	**400	**400	**1,200	Sugar factory
Tracy-Clover Irrigation District	2.1S	1-16	135	225	221	216	214	152	196	88	1,447	400
California Irrigated Farms Co. (Plant No. 3)	6.3S	1-24	333	551	838	740	664	657	432	401	4,616	910
Totals	----------	----------	1,126	1,926	2,529	2,696	2,238	2,419	1,474	1,242	15,650	2,810

* Distance along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River. Mileage on Old River as established by War Department survey of 1913-15.
** Estimated.

TABLE 99

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Valley Land and Sugar Co.	0.7S	1-20	----------	680	1,610	1,168	883	436	----------	4,777	3,700
Alameda Sugar Co.	[1]2.1S	1-12	----------	----------	----------	----------	353.1	540.0	553.5	1,447	Industrial [1]60
Tracy Clover Irrigation District	[2]2.1S	1-16	----------	161	300	327	286	149	157	1,380	1,081
California Irrigated Farms Co.:											
Plant No. 1	2.9S	1-12	----------	----------	152.0	49.0	230.3	30.7	----------	462.0	[3]2,600
Plant No. 3	6.3S	1-18	----------	560	1,053	952	824	701	182	4,272	([3])
Plant No. 5	8.3S	1-12	----------	220.0	234.0	358.7	316.4	241.9	40.8	1,412	([3])
Plant No. 6A	9.2N	1-12	----------	51	142	172	165	106	----------	636	([3])
Totals	----------	----------	----------	1,672	3,491	3,027	3,058	2,205	933	14,386	7,441

* Distance along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River. Mileage on Old River as established by War Department survey of 1913-15.
[1] Waste water from sugar factory is used on 60 acres alfalfa of the sugar company and some is also delivered to Valley Land and Sugar Company land.
[2] To junction of Tom Paine Slough and Dredger Cut. Pumping plant is located 1½ miles south along Dredger Cut.
[3] This is the total uplands area irrigated from plants at Mile 2.9S, 6.3S, 8.3S and 9.2N.

TABLE 100

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Valley Land and Sugar Co.	0.7S	1-20	----------	1,262	1,178	1,189	946	604	----------	[1]5,179	[7]2,160
Alameda Sugar Co. (Holly Sugar Co.)	[2]2.1S	1-12	----------	----------	----------	----------	----------	466	558	[3]1,024	Industrial
Tracy-Clover Irrigation District	[2]2.1S	1-16	30	367	303	290	407	24	113	1,534	619
California Irrigated Farms Co.:											
Plant No. 1	2.9S	1-12	111	127	102	170	126	100	----------	736	[4]2,194
Plant No. 3	6.3S	1-18	499	1,102	1,122	894	853	947	----------	5,417	([5])
Plant No. 5	8.3S	1-12	99	193	176	237	181	145	----------	1,031	([5])
Plant No. 5A[6]	9.0S	1-12	69	209	118	284	161	105	22	968	([5])
Plant No. 6A	9.2N	1-12	118	416	96	174	229	116	----------	1,149	([5])
Totals	----------	----------	926	3,676	3,095	3,238	2,903	2,507	693	17,038	4,973

* Distance along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River (War Department survey of 1913-15).
[1] Some additional water was received through Alameda Sugar Company plant. See Mile 2.1S.
[2] To junction of Tom Paine Slough and Dredger Cut. Pumping plant is located 1½ miles south along Dredger Cut.
[3] A portion of this water was reused by Valley Land and Sugar Company for irrigation of grain land. See Mile 0.7S.
[4] This is the total uplands area (south of Tom Paine Slough) irrigated from California Irrigated Farms Company plants.
[5] See plant at Mile 2.9S.
[6] New installation, 1926.
[7] Includes grain land partially irrigated by reuse of water from Alameda Sugar Company plant.

TABLE 101

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Valley Land and Sugar Co.	0.7S	1-20	26	1,145	943	994	964	513	343	4,928	[1]3,141
Holly-Western Sugar Co.[2]	[2]2.1S	1-12	----------	----------	----------	----------	50	390	403	[4]843	Industrial
Tracy-Clover Irrigation District	[3]2.1S	1-16	15	469	409	252	244	72	223	1,684	631
California Irrigated Farms Co.:											
Plant No. 1	2.9S	1-12	----------	147	126	160	148	124	14	719	[6]2,385
Plant No. 3	6.3S	1-18	24	1,305	1,092	1,253	1,336	1,148	463	6,621	([5])
Plant No. 5	8.3S	1-12	----------	363	191	186	219	256	56	1,271	([6])
Plant No. 5A	9.0S	1-12	----------	52	104	222	160	127	153	818	([6])
Plant No. 6A	9.2N	1-12	29	219	46	32	45	----------	----------	[7]371	([6])
Totals	----------	----------	94	3,700	2,911	3,099	3,166	2,630	1,655	17,255	6,157

* Distance along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River (War Department survey of 1913-15).

[1] Includes 1,100 acres irrigated once prior to plowing by reuse of water from Holly-Western sugar factory. (See Mile 2.1S).

[2] Formerly Alameda Sugar Company.

[3] To junction of Tom Paine Slough and Dredger Cut. Pumping plant is located 1½ miles south along Dredger Cut.

[4] After use in sugar factory this water was used by Valley Land and Sugar Company for irrigation prior to plowing on 1,100 acres. (See Mile 0.7S). Diversion by sugar factory continued until November 14th. November diversion was 182 acre-feet.

[5] This is the total uplands area (south of Tom Paine Slough) irrigated from California Irrigated Farms Company plants.

[6] See plant at Mile 2.9S.

[7] This plant diverts water to lands both north and south of Tom Paine Slough. The diversion here given is that to the south (uplands) only.

TABLE 102

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Stinson Estate Co.[1]	0.7S	1-20	----------	181	651	431	374	536	35	2,208	[2]1,715
Holly-Western Sugar Co.	[3]2.1S	1-12	----------	----------	----------	----------	224	420	434	[4]1,078	Industrial
Tracy-Clover Irrigation District	[3]2.1S	1-16	23	195	380	245	272	257	228	1,600	700
California Irrigated Farms Co.:											
Plant No. 1	2.9S	1-12	----------	161	101	101	68	70	31	532	[2]2,491
Plant No. 3	6.3S	1-18	495	1,150	1,024	1,287	1,112	881	883	6,832	([5])
Plant No. 5	8.3S	1-12	115	294	238	226	216	174	38	1,301	([6])
Plant No. 5A	9.0S	1-12	152	130	195	166	87	159	----------	889	([6])
Plant No. 6A	9.2N	1-12	Plant removed								
Totals	----------	----------	785	2,111	2,589	2,456	2,353	2,497	1,649	14,440	4,906

* Distanee along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River (War Department survey of 1913-15).
[1] Formerly Valley Land and Sugar Company.
[2] Includes 415 acres irrigated by reuse of water from Holly-Western sugar factory. (See Mile 2.1S).
[3] To junction of Tom Paine Slough and Dredger Cut. Pumping plant is located 1½ miles south along Dredger Cut.
[4] After use in sugar factory some of this water was used by Stinson Estate Company for irrigation of 415 acres. (See Mile 0.7S).
[5] This is the total uplands area (south of Tom Paine Slough) irrigated from California Irrigated Farms Company plants.
[6] See plant at Mile 2.9S.

TABLE 103

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1924

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet								Total diversion March to October, acre-feet	Acreage irrigated
			March	April	May	June	July	August	September	October		
Paul Weston	46.3R	1- 4, 1- 6	56	54	56	54	56	56	54	19	405	120
August Eisele	47.2R	1- 5	----------	5	5	5	5	5	5	----------	30	8
Wolfinger Brothers	47.3R	1-10	----------	35	35	35	35	35	20	----------	195	60
Edward Denton	47.5R	1- 4	----------	----------	4	4	4	4	----------	----------	16	7
John Haack	48.0R	1-12	----------	----------	121	40	70	48	255	----------	534	400
Frank Piccardo	48.6R	1- 6	9	27	41	37	25	27	13	6	185	80
G. Aceinielli	48.7R	1- 4	----------	20	32	15	15	24	22	6	134	60
J. Rodgers	50.1R	1- 8	----------	15	15	15	15	15	15	----------	90	15
F. Reichmuth	50.4R	1- 8	19	124	43	99	109	88	67	24	573	100
John Brandt	50.5R	1- 6	7	7	8	10	25	10	5	3	75	20
F. Delima	53.4R	1- 8	30	30	30	30	30	30	30	30	240	40
M. Dos Reis	53.7R	1-10	107	132	176	220	198	164	164	45	1,206	300
W. C. Frank	54.9R	1-10	----------	----------	----------	12	28	23	23	----------	86	60
Oakwood Stock Farms	57.0R	1-14	72	220	227	272	387	308	215	----------	1,701	300
P. Colori Co.	57.5R	1- 4	----------	----------	4	16	21	13	7	----------	[1]61	50
V. Sanguenetti	58.4R	1-2½	----------	----------	4	7	7	6	2	----------	26	10
G. B. Figari	58.6R	1- 3	----------	----------	3	6	7	8	2	----------	26	10
R. Mauro	58.7R	1- 3	----------	----------	2	3	7	4	----------	----------	16	10
H. A. Niestrath	59.3R	1-14	70	75	74	157	206	97	96	----------	775	120
Paul Williamson	63.8R	1-12	----------	----------	350	350	350	350	----------	----------	1,400	465
River View Land and Water Co.	67.5L	1-12	244	382	530	502	575	504	390	73	3,200	2 100
Totals	----------	----------	614	1,126	1,760	1,889	2,175	1,819	1,385	206	10,974	4,335

* Distance along San Joaquin River from its mouth 4½ miles below Antioch. Mileage as established by War Department survey of 1913-15.
[1]See correction in 1928 Report, footnote.

TABLE 104

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1925

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Paul Weston	46.3 R	1- 4, 1- 6	----------	10	112	135	62.6	54.4	----------	374	110
August Eisele	47.2 R	1- 5	----------	1.4	6.4	2.8	2.1	----------	----------	12.7	8
Wohlfinger Brothers (James M. Mills)	47.3 R	1-10	----------	----------	42.6	34.8	34.8	34.8	----------	147	56
Edward Denton	47.5 R	----------	No diversion								
John Haack	48.0 R	1-12	----------	----------	24	26	5	----------	----------	55	100
Frank Piccardo	48.6 R	1- 6	4	6	9.6	18.4	27	7.4	2.6	75	40
G. Accinielli	48.7 R	1- 4	----------	6.4	11.5	11.7	11	9.2	2.2	52	62
J. Rodgers	50.1 R	1-10	----------	----------	----------	36	20.5	----------	----------	56.5	30
F. Reichmuth (Rodgers and Lagler)	50.4 R	1- 8	----------	52.4	62.1	49.3	34.9	11.3	----------	210	76
John Brandt	50.5 R	1- 6	----------	2.7	4.4	0.4	2.1	2.4	----------	12	3
F. Delima (A. L. Dos Reis)	53.4 R	1- 8	----------	13.1	27.2	26.7	21.1	18.2	7.1	113.4	30
M. Dos Reis (Cordoza Sousa, and Avellar)	53.7 R	1-10	----------	95.7	180.3	191.2	155	150.8	----------	773	300
W. C. Frank	54.9 R	1-10	----------	20.4	36.2	17.7	31.7	13	----------	119	40
Oakwood Stock Farms	57.0 R	1-14	----------	----------	268	292	181	107	19	867	214
P. Colori Company	57.5 R	1- 4	2	3	17	14	5	6	2	[2]49	20
V. Sanguenetti	58.4 R	1-2½	0.3	1.2	4.6	3	2.5	0.8	0.4	12.8	5
G. B. Figari	58.6 R	1- 3	----------	0.04	1.16	0.56	0.75	0.26	----------	2.77	2
R. Mauro	58.7 R	1- 3	----------	0.08	0.84	0.85	0.64	0.28	0.04	2.73	3
H. A. Nicstrath (Jos. Egger)	59.3 R	1-14	----------	63	128	----------	176	107	----------	474	125
Paul T. Williamson	63.8 R	1-12	No diversion								
Banta-Carbona Irrigation District[1]	[1]67.5 L	2-20, 3-24	----------	----------	213	670	920	517	6	2,326	2,000
Totals	----------	----------	6	276	1,149	1,530	1,694	1,040	39	5,734	3,224

* Distance along San Joaquin River from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15. Using the War Department Survey figures, the mileage at the junction of the Stanislaus and San Joaquin Rivers is 80.0; at Durham Ferry Bridge (location of gage for "San Joaquin River near Vernalis" gaging station) 76.7; at Lincoln Highway Crossing 59.0 and at French Camp Slough (below lowest diversion in this table) 46.0.

[1] Diversions from this point prior to 1925 by River View Land and Water Company.

[2] See correction in 1928 Report, footnote.

TABLE 105

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1926

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Paul Weston	46.3 R	1- 6, 1- 4	----------	27	135	127	76	34	----------	399	110
August Eisele	47.2 R	1- 5	----------	2	6	3	3	----------	----------	14	8
Wohlfinger Brothers (J. M. Mills)	47.3 R	1-10	----------	38	34	30	32	25	----------	159	56
John Haack	48.0 R	1-12	----------	9	57	29	11	310	----------	416	350
Frank Piccardo	48.6 R	1- 6	----------	8	34	32	25	11	1	111	60
G. Accinielli	48.7 R	1- 6	5	10	30	22	33	20	4	124	[1]82
J. Erlinger	49.0 R	1- 5	17	17	8	4	3	----------	----------	49	[2]22
A. A. Rodgers[3]	50.1 R	1- 8	----------	22	30	31	28	----------	----------	111	80
N. Lagler[4]	50.4 R	1- 8	----------	44	29	43	40	26	----------	182	76
John Brandt	50.5 R	1- 6	----------	8	3	5	2	----------	----------	18	3
F. Delima	53.4 R	1- 8	5	24	18	14	14	13	----------	88	30
M. Dos Reis (Cordoza, Sousa and Avellar)	53.7 R	1-10	36	98	141	107	148	86	39	655	320
W. C. Frank (Martin Co.)	54.9 R	1-10	6	31	13	24	25	26	----------	125	40
Oakwood Stock Farm	57.0 R	1-14	----------	139	116	189	132	122	----------	698	214
A. J. Thompson	57.3 R	1- 5	----------	----------	0.8	----------	----------	----------	----------	0.8	3
P. Colori Company	57.5 R	1- 4	----------	3	7	11	7	4	1	[3]33	22
V. Sanguenetti	58.4 R	1-2½	1.2	0.7	1.2	3.3	2.3	0.2	0.3	9.2	5
G. B. Figari (G. Alfieri)	58.6 R	1- 3	----------	0.9	1.6	1.8	1.6	0.8	0.3	7	2
R. Mauro	58.7 R	1- 3	0.7	0.9	1.9	3.8	1.8	0.2	0.1	9.4	3
H. A. Niestrath (Joseph Egger)	59.3 R	1-14	----------	106	256	205	190	174	----------	931	125
Paul T. Williamson	63.8 R	1-12	No diversion								
Banta-Carbona Irrigation District	67.5 L	3-24, 2-20	5,586	8,211	6,773	7,366	6,918	5,456	1,531	41,841	9,585
Totals	----------	----------	5,657	8,800	7,696	8,251	7,693	6,308	1,577	45,982	11,196

*Distance along San Joaquin River from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15.

[1] Includes 20 acres irrigated for Erlinger, Mile 49.0R.

[2] An additional 20 acres was irrigated through Accinielli pump (see Mile 48.7R).

[3] Listed heretofore as J. Rodgers.

[4] Listed heretofore as F. Reichmuth (Rodgers and Lagler).

[5] See correction in 1928 Report, footnote.

TABLE 106

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1927

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Paul Weston	46.3 R	1- 4, 1- 6	----------	28	84	70	51	14	----------	247	[6]300
August Eisele	47.2 R	1- 5	----------	7.1	6.8	2.5	1.2	----------	----------	17.6	10
Wolfinger Brothers	47.3 R	1-10	----------	30	25	50	25	25	----------	155	55
John Haack[1]	47.7 R	1- 4	2.6	0.2	1.2	0.5	1.4	----------	----------	5.9	[2]255
John Haack	48.0 R	1-12	----------	----------	39	----------	----------	166	28	233	([4])
Joe Calcagno[1]	48.5 R	1- 6	----------	----------	20	5	21	----------	----------	46	30
Frank Piccardo	48.6 R	1- 6	8	12.2	25.4	14.6	11.2	4.2	0.7	76.3	60
G. Accinielli	48.7 R	1- 6	14	33	25	13	43	23	10	161	60
Mrs. Couper (M. Matsumoto)[4]	49.0 R	1- 5	----------	4	15	11	21	7	----------	58	25
A. A. Rodgers	50.1 R	1- 8	----------	22	18	15	16	12	----------	83	80
N. Lagler and Joe Reichmuth[5]	50.4 R	1- 8	9	42	42	43	38	35	7	216	65
John Brandt	50.5 R	1- 6	----------	----------	3	3.7	3.9	2.6	1.1	14.3	3
F. Delima	53.4 R	1- 8	----------	18.4	18.2	18.3	8.8	8	----------	71.7	30
M. Dos Reis (Cordoza, Sousa and Avellar)	53.7 R	1-10	----------	263	169	198	202	76	32	940	400
W. C. Frank (M. Martin Company)	54.9 R	1-10	----------	----------	42	36	32	----------	----------	110	40
Oakwood Stock Farm	57.0 R	1-14	41	99	133	120	130	78	27	628	304
A. J. Thompson	57.3 R	1- 5	----------	----------	----------	----------	0.6	0.1	----------	0.7	1.5
P. Colori Company	57.5 R	1- 4	0.9	6	5.3	6.7	6.4	1.1	0.3	[6]26.7	22
V. Sanguenetti	58.4 R	1-2½	1.2	0.9	1.2	2.5	2.3	0.5	0.6	9.2	2
G. B. Figari (G. Alfieri)	58.6 R	1- 3	0.60	0.80	1.30	1.25	1.25	0.30	0.40	5.90	2
R. Mauro	58.7 R	1- 3	1.8	0.8	2.9	1.3	1.6	0.9	0.4	9.7	2
H. A. Niestrath (Joseph Egger)	59.3 R	1-14	----------	57	54	66	58	117	----------	352	100
John Kilcannon[7]	63.8 R	----------	No diversion								
Banta-Carbona Irrigation Dist.	67.5 L	3-24, 2-20	634	7,906	7,488	8,227	8,685	3,731	629	37,300	[6]10,924
River Junction Farms Co.[8]	73.2 R	1-12	----------	----------	5	22	17	15	9	68	100
Totals	----------	----------	713	8,530	8,224	8,927	9,378	4,317	746	40,835	12,870

*Distance along San Joaquin River from its mouth four and one-half miles below Antioch. (Mileage as established by War Department Survey of 1913-15.)

[1] New installation 1927.

[2] This is combined acreage irrigated from plants at 47.7R and 48.0R.

[3] See plant at Mile 47.7R.

[4] Formerly J. Erlinger.

[5] Listed 1926 as N. Lagler.

[6] See correction in Table 107, footnote.

[7] Formerly Paul T. Williamson.

[8] New installation 1927.

TABLE 107

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1928

Water user	*Mile and bank	Number and size of pump	Monthly diversions in acre-feet							Total diversion April to October, acre-feet	Acreage irrigated
			April	May	June	July	August	September	October		
Paul Weston	46.3 R	1- 4, 1- 6	----------	77	75	47	42	19	----------	260	[1]130
August Eisele	47.2 R	1- 5	2	2.9	3.3	3.3	2.5	----------	----------	14	9
Wolfinger Brothers	47.3 R	1-10	----------	39	26	33	33	----------	----------	131	55
John Haack	47.7 R	1- 4	----------	----------	2.8	----------	----------	----------	----------	2.8	[2]105
John Haack	48.0 R	1-12	----------	----------	31	44	----------	----------	----------	75	([3])
Joe Calcagno	48.5 R	1- 6	----------	----------	41	8	24	27	25	125	68
Frank Piccardo	48.6 R	1- 6	3	14	4	9	8	4	1	43	40
G. Accinielli	48.7 R	1- 6	12	29	25	22	49	35	17	189	47
M. O. Couper (M. Matsumoto)	49.0 R	1- 5	----------	1.9	2.6	3.8	1	0.5	----------	9.8	2
A. A. Rodgers	50.1 R	1- 8	----------	37	39	21	32	3	----------	132	90
N. Lagler and Joe Reichmuth	50.4 R	1- 8	----------	42	44	36	38	23	6	189	73
John Brandt	50.5 R	1- 6	----------	6.2	5	2.5	----------	----------	----------	13.7	3
F. Delima	53.4 R	1- 8	----------	8	11	19	5	7	----------	50	33
M. Dos Reis (Cordoza, Sousa and Avellar)	53.7 R	1-10	46	125	195	187	172	129	----------	854	400
W. C. Frank (M. Martin Co.)	54.9 R	1-10	----------	19	27	15	31	15	4	111	45
Oakwood Stock Farm	57.0 R	1-14	45	134	168	165	137	106	35	790	353
A. J. Thompson	57.3 R	1- 5	----------	5.6	----------	----------	----------	----------	----------	5.6	5
P. Colori Company	57.5 R	1- 4	10	10	17	11	10	3	----------	[4]61	30
V. Sanguenetti	58.4 R	1-2½	3.3	1.3	2.6	3.6	3.1	0.4	0.2	14.5	5
G. B. Figari (G. Alfieri)	58.6 R	1- 3	0.8	0.9	1.4	1.6	1.6	0.3	0.2	6.8	3
R. Mauro	58.7 R	1- 3	1	2.1	2	1.3	1.7	1.2	----------	9.3	4
H. A. Niestrath (Joseph Egger)	59.3 R	1-14	10	29	61	78	50	56	----------	284	85
John Kilcannon	63.8 R	----------	Not installed in 1928								
Banta-Carbona Irrigation District	67.5 L	1-36, 3-24, 2-20	2,942	7,331	6,739	8,374	7,473	4,145	1,754	38,758	[2]15,734
River Junction Farms Company	73.2 R	1-12	----------	----------	----------	56	45	30	7	138	260
Totals	----------	----------	3,075	7,915	7,523	9,141	8,159	4,604	1,849	42,266	17,579

*Distance along San Joaquin River from its mouth four and one-half miles below Antioch. (Mileage as established by War Department Survey of 1913-15).

[1] Acreage was erroneously reported for 1927 in the report for that year. Should have been 120 instead of 300.

[2] This is combined acreage irrigated from plants at miles 47.7R and 48.0R.

[3] See plant at Mile 47.7R.

[4] Through error in basic data, diversions computed for this plant in previous years have been incorrect. Diversions should have been reported:

Year	April	May	June	July	August	September	October	Total
1924	0	3	12	17	10	5	0	47
1925	1	2	12	10	4	4	2	35
1926	0	4	9	14	9	5	1	42
1927	2	15	13	16	15	3	1	65

[5] Includes 2,000 acres not in the district on the old River View Land and Water Company property which district is obligated to serve. Note that 1,100 acres irrigated on this outside land in 1927 should have been given in addition to the acreage shown as irrigated in the 1927 Report.

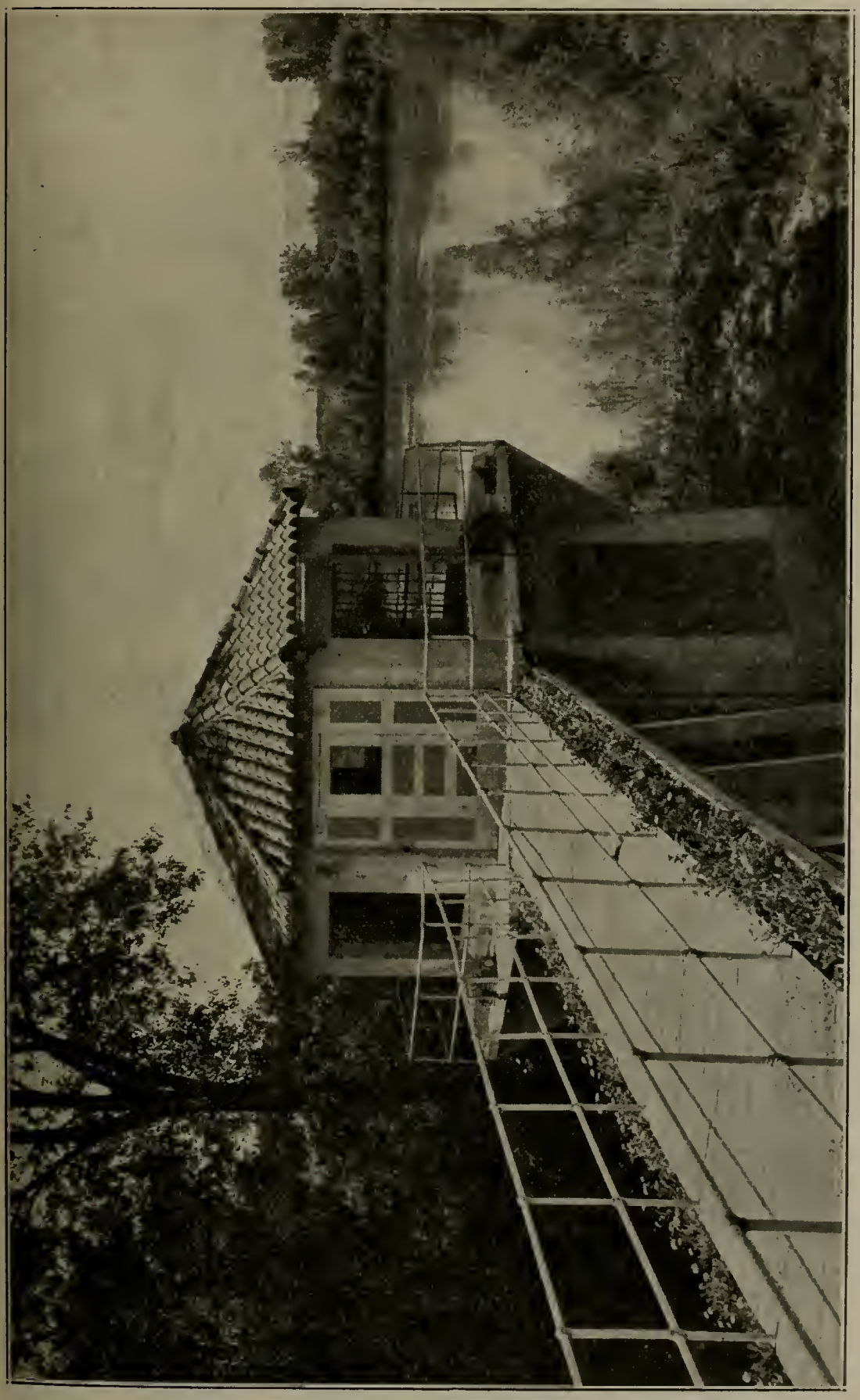

PLATE 5—Picturesque Sacramento River Diversion Fourteen Miles above Sacramento.

TABLE 108

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
ADAMS BROTHERS										
***MILE 242.5R. PUMP, 1-6″**										
1924		11	82	73	32	26		224	250	
1925			43	103	25	14	6	191	70	
1926	17	20	85	62	19	20		223	50	
1927		4	12	15	3	2	1	37	50	
1928		25	15	19	21	11	2	93	67	
GEO. P. AHLF										
MILE 80.3R. PUMP, 1-8″										
1924										
1925										
1926										
1927				2	62			64	65	
1928	No diversion									
GEO. P. AHLF										
MILE 92.5L. PUMP, 1-14″										
1924	185	140	45	157	40	25	92	584	70	
1925				144	35			179	90	
1926				124	19	8	39	190	155	
1927			42	46	50	16		154	155	
1928			48	87	34			169	155	
GEO. P. AHLF										
MILE 92.5L. PUMP, 1-8″										
1924	31	44					30	105	65	
1925				39				39	65	
1926										
1927										
1928	Plant removed									

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JESSE ALFORD [1]										
MILE 209.0L. PUMP, 1-2½"										
1924			5			1		6	6	
1925			5			1		6	6	
1926			5			1		6	6	
1927	No diversion									
1928					0.3			0.3	2	
AMERICAN TRUST CO.[2]										
MILE 103.7R. PUMP, 1-16"										
1924										
1925										
1926										
1927		47	417	465	273	256		1,458	480	
1928		771	636	372	418	295	87	2,579	355	160
ANDERSON COTTONWOOD IRRIGATION DISTRICT										
MILE 243.0R. GRAVITY										
1924	8,930	12,300	15,400	18,100	17,600	17,000	7,680	97,010	19,000	
1925	883	13,210	18,758	22,800	22,853	20,568	4,530	103,602	15,000	
1926	6,573	15,084	19,807	22,122	18,141	15,554	7,279	104,560	19,000	
1927	2,400	12,000	17,300	20,000	19,100	17,800	13,000	101,600	17,000	
1928	2,100	17,400	20,000	21,400	21,300	20,300	8,700	111,200	20,000	
S. E. AYER										
MILE 193.6R. PUMP, 1-3"										
1924										
1925										
1926										
1927										
1928			1.6	3.2				4.8	4	
S. E. AYER										
MILE 194.1R. PUMP, 1-3", 1924-25: 1-6", 1926-27-28										
1924		2	2	2	3	1		10	18	
1925				1	2			3	14	
1926		6	34	36	13			89	72	
1927			5	36	24			65	32	
1928			5	25	3			33	32	

*Mileage measured upstream from Southern Pacific Bridge, Sacramento.

[1] A. N. Cunningham, 1924, 1925 and 1926; Hathaway and Wohlf, 1927.

[2] Was Mercantile Trust Company in 1926 and in that year used pumps of Compton-Delevan Irrigation District at Mile 103.8R. (See District record for 1926.)

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
W. M. BAKER										
MILE 62.6R. PUMP, 1-8″										
1924			26					26	17	
1925				12				12	17	
1926			10	4				14	8	
1927	No diversion									
1928				6		4		10	5	
J. E. BANDY										
MILE 6.00R. PUMP, 1-6″										
1924	No diversion									
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928			43	46	18	20	15	142	90	
W. E. M. BEARDSLEE										
MILE 3.75R. PUMP, 1-5″										
1924	2	6	14	14	8	3	2	49	13	
1925				6				6	10	
1926	No diversion									
1927	No diversion									
1928			11	8				19	20	
FRANK BECKLEY										
MILE 98.0L PUMP, 1-6″										
1924					7	4		11	68	
1925	No diversion									
1926	No diversion									
1927					8			8	26	
1928				8				8	10	

M. E. AND R. F. BENNETT MILE 7.9L. PUMP, 1-10″										
1924		35	60	46	39	19		199	90	
1925				28	35	12		75	77	
1926			24	31	44			99	89	
1927			3	29	58			90	89	
1928			45	48	96			189	81	
J. H. BERGHAUSER MILE 21.7R PUMPS, 1-15″, 1-12″										
1924										
1925										
1926										
1927		137	683	439	559	394	203	2,415		215
1928	No diversion									
JULIUS BLAUTH MILE 8.5R. PUMP, 1-5″										
1924		17	68	89	1	2	12	189	100	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
T. H. BOGGS AND SISTERS MILE 89.8L. PUMP, 1-12″										
1924	43	28	22	69	18	6		186	45	
1925			5	5	3			13	45	
1926			22	26	6	6		60	25	
1927			4	27	9	8		48	25	
1928		15	9	18	5	4		51	60	
WM. AND D. BOGGS MILE 98.8L. PUMP, 1-18″										
1924	15	81	73	53	49	2		273	130	
1925			55	103	69			227	205	
1926				40	36	20	18	114	200	
1927		12	174	198	47	65		496	295	
1928		18	83	70	43	15		229	121	

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
BOLLA BROTHERS [1] MILE 97.7R. PUMP, 1-20"										
1924	248	125	57	68	18	25		541	65	
1925			46	17	46			109	65	
1926	No diversion									
1927		15	12	14	6	7	31	85	20	
1928	3	31	28	19	12	20		113	25	
W. W. BOTTIMORE MILE 37.2L PUMPS, 1-14", 1-8"[2]										
1924										
1925										
1926										
1927		203	421	587	744	650	264	2,869	87	
1928		166						166	86	
T. K. BREARCLIFFE MILE 192.5R. PUMP, 1-4"										
1924			1	2	2	1	1	7	3	
1925				4	3			7	5	
1926	2	2	2	2	2	2	2	14	2.5	
1927	No diversion									
1928	Plant removed									
U. W. BROWN MILE 93.0R. PUMP, 1-12"										
1924	151	49	37	5				242	80	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	Plant removed									

J. L. BROWNING MILE 69.0R. PUMP, 1-24''										
1924	107	120	226	179	52	91		775	300	
1925			34	161	133	24	72	424	130	
1926			308	117	94	92		611	250	
1927		243	174		270		154	841	240	
1928			425	153	53			631	240	
BUELL RANCH (M. K. DEAN) MILE 41.8L. PUMP, 1-4''										
1924										
1925										
1926										
1927			7.2	6.4	6.4	5.6		25.6	30	
1928	No diversion									
L. W. BUNDOCK MILE 37.75L. PUMP, 1-8''										
1924										
1925										
1926		26	53					79	86	
1927			4		48			52	85	
1928				24	7			31	88	
GEO. BUTLER (A. F. LANDIS)[3] MILE 166.7R. PUMP, 1-3''										
1924		9	10	6	6	9		40	10	
1925				4	12	10	3	29	10	
1926		2	3	6	5	3	1	20	10	
1927	1.2	2.8	3.4	5.0	3.9	3.7	1.6	21.6	10	
1928				1.4	2.4	2.0	1.6	7.4	5	
BUTTE CITY RANCH MILE 115.8R PUMPS, 1-8'', 1924-25-26 1-12'', 1927-28										
1924	59	151	151	83	20	45	77	586	[4]415	
1925					43			43	[4]411	
1926	No diversion									
1927			13	54	4			71	40	
1928			39	36	4			79	55	

[1] D. P. O'Sullivan prior to 1927.
[2] 8 inch pump used only in 1927.
[3] J. M. Wight prior to 1928.
[4] Total for all Butte City Ranch pumps is given for pump at Mile 115.8R.
NOTE—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
BUTTE CITY RANCH MILE 116.7R. PUMP, 1-8"										
1924	50	50	100	100	100			400	(1)	
1925	Plant removed									
1926										
1927										
1928										
BUTTE CITY RANCH MILE 116.7R. PUMP, 1-12"										
1924	140	140	290	290	290			1,150	(1)	
1925				52	82			134	(1)	
1926	No diversion									
1927	No diversion									
1928	Plant removed									
CALIFORNIA JOINT STOCK LAND BANK (SHELLOOE) MILE 124.4R. PUMP, 1-16"										
1924										
1925										
1926			170	214	184	209	62	839	280	
1927		271	240	296	202	54		1,063	273	
1928		283	275	243	155	157		1,113	359	
CALIFORNIA BANK AND TRUST CO.[1] MILE 7.50L. PUMP, 1-8"										
1924		43	53	42	43	13		194	100	
1925	1	4	37	43	1			86	100	
1926			9	26	29			64	100	
1927	No diversion									
1928	No diversion									

CALIFORNIA BANK AND TRUST CO.[3] MILE 13.25R. PUMP, 1-12″										
1924										
1925			19					19	15	
1926	No diversion									
1927	No diversion									
1928	No diversion									
CAMPBELL-DWYER (LOWER) MILE 86.9R. PUMP, 1-16″										
1924	185	156	116	92	46	25		620	90	
1925			12	194	47			253	160	
1926		22	41	44		6		113	71	
1927	No diversion									
1928			218		65	20	99	402	197	
CAMPBELL-DWYER (UPPER) MILE 87.4R. PUMP, 1-15″										
1924	85	35	78	56	60	11	4	329	45	
1925				99	2			101	85	
1926			78	78	74			230	70	
1927	No diversion									
1928	No diversion									
A. CASSELMAN MILE 5.5R. PUMP, 1-5″										
1924	1	1	17	1	1	1		22	15	
1925	No diversion									
1926				13				13	18	
1927		7						7	18	
1928			14					14	34	
CARL CASSELMAN[4] MILE 9.90R. PUMP, 1-12″										
1924	42	101	97	63	104	55		462	85	
1925			120	79	76	36	10	321	85	
1926		45	108	121	20	38		332	130	
1927		33	54	47	45	29	13	221	130	
1928		24	47	48	43	47	4	213	125	

[1] J. B. Parkinson prior to 1927.
[2] Total for all Butte City Ranch pumps is given for pump at Mile 115.8R.
[3] A. A. Merkeley prior to 1926.
[4] George and Carl Casselman prior to 1927.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
CENTRAL MUTUAL WATER CO. MILE 16.0L PUMPS, 2-38", 1-22"										
1924	2,310	3,140	2,880	2,760	3,060	605		14,755	1,103	1,270
1925	67	1,782	2,650	3,086	3,089	2,540	711	13,925	1,292	1,086
1926	1,089	2,569	4,218	4,313	3,286	495		15,970	1,590	2,035
1927	1,260	3,056	3,471	3,749	3,252	1,762	55	16,605	1,116	1,694
1928	1,878	3,270	4,577	4,591	4,481	2,887		21,684	2,121	1,921
CHENEY SLOUGH IRRIGATION DISTRICT MILE 99.0R PUMPS, 1-36", 2-26"										
1924	1,720	2,610	2,180	2,000	1,740	638		10,888	205	520
1925		1,331	1,550	1,990	1,568	1,340	152	7,931	290	500
1926		6,870	7,855	7,550	6,785	2,392	22	31,474	350	3,920
1927	202	6,706	7,063	6,663	6,276	2,795	27	29,732	260	2,616
1928	No diversion									
FRANK CHRISTOPHEL MILE 2.4L. PUMP, 1-5"										
1924		13	12	32	6		8	71	35	
1925			16.9	6.0	10.6	3.3		36.8	35	
1926			0.3	28.5	12.5	5.4		46.7	34	
1927			11.1	9.9	2.5	5.8		29.3	34	
1928		6.9	5.0	8.8	4.1	7.8		32.6	34	
JOHN CLAUSS MILE 47.3L. PUMP, 1-14"										
1924										
1925										
1926										
1927			135					135	98	
1928	No diversion									

CLOMAN LAND AND SHEEP CO. MILE 64.3R. PUMP, 1-12''										
1924	27	31	13	19	5	3		98	60	
1925			9	15			10	34	60	
1926	51		10		9			70	20	
1927		5						5	Stock water	
1928		14	17					31	[1]5	
COLLIER BROTHERS MILE 32.5R. PUMP, 1-10''										
1924	16	18	34	36	42	4	4	154	50	
1925				5.0	31.0	6.0	8.0	50.0	20	
1926				14	16	14		44	20	
1927				6.0	26.1	12.7	4.7	49.5	22	
1928		4.3	4.8	15.7	11.6	11.1	3.2	50.7	30	
COLUSA DELTA FARMS (REC. DIST. 1004) MILE 89.3L. PUMP, 1-20''										
1924	376	1,260	428	760	149	60	49	3,082	1,545	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
COLUSA IRRIGATION CO. MILE 89.2R. PUMP, 1-20''										
1924	250	240	493	350	228	15	58	1,634	1,000	
1925		94	582	353	350	53	74	1,506	450	
1926		90	495	394	209	65	88	1,341	866	
1927		259	242	435	242	206		1,384	785	
1928		355	559	465	112	49	130	1,670	852	
COMMERCIAL INVESTMENT CO. (R. B. BAILEY) MILE 34.85L. PUMP, 1-12''										
1924										
1925										
1926										
1927		32	63	64	75			234	100	
1928		94	70	53	48			265	135	

[1] Also some stock water.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
COMMERCIAL INVESTMENT CO. MILE 39.80L. PUMP, 1-10″										
1924										
1925										
1926										
1927										
1928			48	28	28	29		133	70	
COMPTON-DELEVAN IRRIGATION DISTRICT MILE 103.8R PUMPS, 2-24″, 1-36″										
1924	1,070	568	277	310	400	157	6	2,788	100	[1]1,000
1925		2,263	2,770	3,665	1,243	523	403	10,867	110	[2]2,500
1926		209	771	801	790			2,571	[3]683	
1927	No diversion									
1928	No diversion									
COMPTON-DELEVAN IRRIGATION DISTRICT MILE 154.8R. PUMPS, (SEE GLENN-COLUSA IRRIGATION DISTRICT)										
1924										
1925			1,675	1,462	3,381	1,608		8,126	[1]110	[2]2,500
1926		5,076	4,378	4,530	5,187	982		20,153	[3]60	3,994
1927	189	4,897	4,112	3,999	3,855	1,930	200	19,182		2,737
1928	600	5,070	4,620	3,970	3,620	978		18,858		2,394
CONAWAY RANCH MILE 12.0R. PUMPS, 4-36″										
1924	2,460	2,810	3,650	3,550	3,740	1,440		17,650	1,540	2,500
1925	3,460	2,808	3,825	4,249	3,966	856		19,164	460	3,665
1926	731	3,245	8,229	8,440	7,175	1,365		29,185	780	5,000
1927	23	3,368	3,437	4,539	3,242	686		15,295	888	2,037
1928	1,009	3,188	5,409	4,712	4,347	1,482		20,147	155	2,971

THOS. J. COULTER MILE 60.5L. Pump, 1-12″										
1924										
1925	No diversion									
1926			8	16				24	21	
1927			101	26	29	27		183	50	
1928			102	69	46			217	82	
TOM CROUCH MILE 119.0L. Pump, 1-10″										
1924	40	68	44	55	51	60		318	70	
1925			68	26				94	70	
1926			29	20	18	18	9	94	70	
1927			20	24	26	15		85	70	
1928				26		22		48	50	
SEBIA DAVIS MILE 78.8R. PUMP, 1-24″										
1924										
1925										
1926										
1927	300	878	1,617	1,613	1,722	938		7,068		1,570
1928	546	1,413	1,493	1,228	1,208			5,888		1,180
J. B. DE JARNETT MILE 88.2R. PUMP, 1-10″										
1924	78		88	58			23	247	70	
1925				32		21		53	140	
1926			22					22	60	
1927			25	21				46	60	
1928			13	37				50	60	
J. B. DE JARNETT MILE 88.7L. PUMP, 1-14″										
1924		125	122	33	70	32	7	389	105	
1925			85	81	145	11		322	105	
1926			100	308	71			479	[6]460	
1927			101	53	99	17	18	288	300	
1928		14	128	98	63	25	11	339	300	

[1] This acreage irrigated both from river and Colusa Trough, the greater portion from the Trough.
[2] For this acreage also the district received 8,126 acre-feet during the season through Glenn-Colusa Irrigation District system. See Mile 154.8R.
[3] Mercantile Trust Company acreage.
[4] See Mile 103.8R.
[5] Gun Club.
[6] Includes 160 acres of Colusa Delta farm lands irrigated from this pump.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
JOHN DIESTELHORST MILE 243.0R. PUMP, 1-5″										
1924	118	75	112	115	117	93	29	659	30	
1925			24	79	84	31		218	30	
1926	42	91	117	88	72	90		500	30	
1927		74	88	110	86	68	40	466	30	
1928	2	29	31	31	26	20	11	150	30	
J. H. DONNELLY (A. MARCONI) MILE 35.8L. PUMP, 1-10″										
1924		84			109	73	9	275	65	
1925			13	14	26			53	40	
1926		62	61	29		6		158	93	
1927		2	76	17		5		100	75	
1928		15		5	4	3		27	28	
WM. DREHER (J. G. GOULART) MILE 30.75L. PUMP, 1-8″										
1924										
1925										
1926						30		30	10	
1927		88	158	152	165	157		720	7	39
1928	12	167	156	163	82			580	18	38
PEARL EDWARDS MILE 197.73L. PUMP, 1-6″										
1924										
1925										
1926				4 7				4 7	10	
1927				5 5				5 5	10	
1928			1 6	3 5				5 1	10	

J. A. EDWARDS MILE 196.2L. PUMP, 1-6″										
1924		17	17		5			39	43	
1925		12	12		4			28	30	
1926			1	27	9			37	30	
1927			14	21				35	30	
1928			20	62				82	30	
EL DORADO RANCH MILE 43.1R. PUMP, 1-18″										
1924	166	295	305	306	288	232		1,592	600	
1925		63	226	279	307	76		951	575	
1926	31	146	440	367	374	158		1,516	575	
1927		313	512	578	454	208		2,065	621	
1928	379	493	431	390	194	53		1,940	572	
ELKHORN MUTUAL WATER COMPANY MILE 14.1L PUMPS, 1-24,″ 1-20″										
1924	370	2,630	2,320	2,410	1,440	880	71	10,121	2,419	
1925			1,500	1,831	1,488	689		5,508	3,238	
1926		184	1,721	2,143	1,404	673		6,125	2,112	
1927		285	1,610	1,819	1,750	567		6,031	2,699	
1928		484	2,518	1,931	703	560		6,196	2,585	
ALBERT ELKUS MILE 2.9L PUMP, 1-3,″ 1924-25; 1-5,″ 1926-27-28										
1924					3			3	5	
1925	No diversion									
1926					7	6		13	5	
1927				2.4				2.4	8	
1928			17.7	6.1				23.8	18	
W. I. ELLIOTT MILE 4.00R. PUMP, 1-8″										
1924		78	83	77	17	15		270	150	
1925			28	53	55			136	150	
1926	20	20	19	71	32	21		183	135	
1927			29	8	67			104	130	
1928		8	103	72	87	26		296	130	

[1] Actual diversion was 647 acre-feet but it is estimated that all but 150 acre-feet returned immediately to river.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
J. ERICKSON MILE 196.6L PUMPS, 1-3,'' 1-5''										
1924	1	1	6	1		1		10	25	
1925	1.2	1.2	6.2	0.7		1.2		10.5	25	
1926			5 3	0 8		0.6		6 7	27	
1927			12 2	11.3				23 5	27	
1928		4	11	5			2	22	27	
J. L. ERISEY MILE 98.3R. PUMP, 1-10''										
1924										
1925										
1926			1				31	32	20	
1927	No diversion									
1928	No diversion									
F. W. FARNSWORTH MILE 95.2L PUMPS, 1-20,'' 1-14''										
1924										
1925	No diversion									
1926	15	627	1,138	1,246	1,278	804		5,108	300	400
1927	No diversion									
1928	No diversion									
FAXON RANCH MILE 69.2R. PUMP, 1-18''										
1924	69	539	266	112	18	41		1,045	405	
1925			110	140	24		60	334	94	
1926			220	37	86	28		371	244	
1927		123	196	82	82	9	119	611	295	
1928		185	202	320	130		80	917	415	

R. F. FIDDYMENT AND E. J. CAHILL. MILE 10.75L PUMP, 1-12''										
1924	5	37	45	104	112	41	36	380	60	
1925				29	45			74	145	
1926			32	25	21	33		111	95	
1927			32	70	30	11		143	95	
1928			55	75	43			173	95	
FRANK FISHER AND HENRY RICH (HERSHEY PLANT) MILE 16.27R. PUMP, 1-20''										
1924										
1925										
1926										
1927		247	977	950	926	886	444	4,430	180	445
1928		381	910	986	955	144		3,376	79	365
FRANK FISHER AND HENRY RICH (MULL PLANT) MILE 17.75R PUMPS, 1-15,'' 1926-27 1-20,'' 1928										
1924										
1925										
1926			287					287	296	
1927			271	501	400	109		[2]1,281	113	40
1928		508	892	973	967			3,340	336	330
FRANK FISHER AND HENRY RICH (HOOVER PLANT) MILE 18.95R. PUMP, 1-18''										
1924										
1925										
1926										
1927			113	604	711	697	40	2,165	190	80
1928		112	581	570	548	232		2,043	220	73

[1] 3 inch pump 1924-25-26; 3 inch and 5 inch 1927-28.
[2] Some of this diversion was used on rice to the west under the Fisher and Rich "Keller" plant.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
FRANK FISHER AND HENRY RICH[1] (KELLER PLANT) MILE 22.5R. PUMP, 1-22½										
1924			547	179	20			746	200	
1925			793	272	218			1,283	220	
1926		581	1,049	1,509	1,396	692		5,227	281	637
1927		953	1,936	1,861	1,926	1,478	88	8,242	183	1,350
1928		1,615	1,954	2,017	1,921	440		7,947	165	1,032
R. A. FOSTER MILE 168.7R. PUMP, 1-5″										
1924			18	32	24	15		89	95	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
R. A. FOSTER MILE 169.1R. PUMP, 1-8″										
1924		13	30	26		12	3	84	30	
1925					39.0	58.0		97.0	30	
1926			46	38	44	50		178	150	
1927	No diversion									
1928	No diversion									
E. FOURNESS MILE 1.45R. PUMP, 1-8″										
1924		8	12	17	8			45	40	
1925	No diversion									
1926		8	22			14		44	45	
1927			4	7	27	44	17	99	81	
1928	3	14	51	32	28	15		143	90	

W. H. FREEMEYER MILE 197.6L. PUMP, 1-4″										
1924				8	1			9	[3]35	
1925	No diversion									
1926			1.5	1.5	1.5			4.5	10	
1927	No diversion									
1928	Plant removed									
FREEMEYER BROTHERS MILE 197.65L. PUMP, 1-3″										
1924				8	1			9	([5])	
1925			0.9	2.4				3.3	35	
1926			2.8	3.7				6.5	35	
1927			5	1				6	20	
1928			5	1				6	20	
LAURA FREITAS MILE 29.9L. PUMP, 1-12″										
1924										
1925										
1926			11		10	1		22	55	
1927			8		10	1		19	30	
1928			8		8			16	30	
J. R. GAILBRAITH (J. A. CAMPBELL)[4] MILE 55.1L. PUMP, 1-20″										
1924	127	46			117	114	187	591		60
1925			194	72	32	260	109	667	612	
1926		65	189	65	54			373	790	
1927			151	128		133		412	336	
1928		200	367	145	88			800	[5]1,500	[5]510
J R GAILBRAITH (J. A. CAMPBELL) MILE 56.95L. PUMP, 1-20″										
1924										
1925										
1926										
1927		798	1,063	1,243	1,261	1,220	203	5,788	75	890
1928	318	903	1,220	1,213	986	532		5,172	([5])	([6])

[1] C. S. Luce, 1924 and 1925.
[2] 1924 and 1925, 18 inches; 1926, 12, 15, and 20 inches; 1927 and 1928, 22 inches.
[3] Acreage irrigated from both plants, Mile 197.6L and 197.65L.
[4] A. T. Spencer and Spencer Ranch Company prior to 1927.
[5] This includes acreage irrigated both from this plant and that at Mile 56.95L.
[6] See plant at Mile 55.1L.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
P. E. GARMIRE MILE 83.6L. PUMP, 1-10″										
1924		25		13		8		46	20	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
DAVE GEORGE (J. M. WESTLUND)[1] MILE 99.8L. PUMP, 1-12″										
1924	20	42						62	36	
1925				22				22	36	
1926	No diversion									
1927	No diversion									
1928	No diversion									
CHARLES GHISELLI MILE 30.25L. PUMP, 1-6″										
1924										
1925										
1926										
1927	8	57	67	78	101	81		392	12	49
1928	No diversion									
CHARLES GHISELLI MILE 30.45L. PUMP, 1-2″										
1924										
1925										
1926	1	1	1	1	2	6	2	14	5	
1927			1.3	0.9	0.7	1.1	0.3	4.3	8	
1928		1.9	2.2	1.7	0.7	0.2		6.7	22	

HENRY GIANELLA[2]										
1924	84	129	107	183	141	43		687	100	
1925			73	62	59			194	160	
1926			72	55	40			167	100	
1927		12	13	48	21	168	44	306	125	
1928		33	52	53	43	14		195	107	
JOSEPH GIANELLA[3] OPPOSITE MILE 150.0L[4] PUMP, 1-10″										
1924		86	152	137	89	31		495	150	
1925			36	30	58			124	100	
1926	No diversion									
1927	No diversion									
1928	No diversion									
A. W. GIBSON (T. A. CROOK) MILE 196.4L. PUMPS, 1-6″, 1926; 1-8″, 1927-28										
1924										
1925										
1926			10	14	10	3	3	40	14	
1927		5	31	38	22	5		101	20	
1928		32	13	9	11			65	15	
LEO GIOVANETTI MILE 30.2L. PUMP, 1-3″										
1924										
1925										
1926		1.1	1.2	1.2	1.2	1.2	1.1	7.0	5	
1927		4.8	10.6	10.1	2.0	1.0	1.0	29.5	5	10
1928		1.5	3.5	3.0	2.6	1.4	1.2	13.2	8	
GLENN-COLUSA IRRIGATION DISTRICT[5] MILE 154.8R. PUMPS, 2-30″, 1-42″, 2-50″, 4-72″, 1-100″										
1924	26,810	50,060	52,170	51,320	41,570	24,320	4,885	251,135	14,594	25,302
1925		7,624	50,211	60,127	56,940	35,399	2,394	212,695	8,633	20,807
1926	3,600	70,393	81,236	79,087	70,090	34,568	15,139	354,113	7,874	33,763
1927	5,016	63,586	66,850	73,227	69,973	35,745	15,015	329,412	11,831	25,450
1928	6,570	60,478	58,016	58,589	58,628	27,076	11,846	281,203	15,371	18,319

[1] U. W. Brown Jr. (Byron Weast), prior to 1926.
[2] Gianella Heirs Company, 1926 and 1927; J. L. Gianella, 1924 and 1925.
[3] G. F. Alves, 1924; Manuel Miguel Company, 1925, 1926 and 1927.
[4] Pump on Nord Slough or Pine Creek Lagoon which joins river at Mile 147.0L. Plant is located 3 miles up slough on right bank or opposite 150.0L, Sacramento River.
[5] Diversions are also made at this plant for Jacinto, Compton-Delevan and Provident Irrigation Districts. The figures given are for Glenn-Colusa District only.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
E. M. GORDAN MILE 103.9R PUMPS, 1-16", 1-20"										
1924						23		23	10	
1925					48	40		89	40	
1926	10	381	660	640	650	98		2,439	59	491
1927	128	1,107	1,140	958	927	767	6	5,033		480
1928	No diversion									
B. F. GOULD MILE 104.8L. PUMP, 1-26"										
1924	735	877	402	453	168	246		2,881	500	
1925				749	277	142		1,168	450	
1926			336	432	308	80	214	1,370	498	
1927		172	34	274	169	63		712	570	
1928		48	555	107	234	117	210	1,271	570	
BRIDGET GRAHAM ESTATE MILE 95.8L PUMPS, 1-20," 1-16"										
1924	35	126	20	10	10		15	216	41	
1925	No diversion									
1926	305	1,558	1,377	764	743	453		[1]5,200	45	711
1927			43	209				252	33	
1928			289	376	72	101		838	217	
T. T. C. GREGORY MILE 8.95R. PUMP, 1-18"										
1924	293	276	280	432	261	19	16	1,586	756	
1925			74	121	52		14	261	400	
1926			43	247	256			546	700	
1927		98	249	228	188	6		769	780	
1928		357	298	210	18		54	937	749	

GRIFFEN BROTHERS[2] MILE 206.0L. PUMP, 1-6″										
1924										
1925										
1926			10	14	7			31	53	
1927	No diversion									
1928		19						19	23	
WM. H. HALL MILE 166.8R. PUMP, 1-2″										
1924	1.4	2.9	2.9	1.5	2.9	1.9	1.2	14.7	5	
1925				2.5	4.1	2.6	1.5	10.7	5	
1926		0.05	1.12	0.86	0.52	0.81	0.04	3.40	4	
1927		1.3	2.1	1.7	2.2	2.1	1.2	10.6	4	
1928		0.9	1.7	0.9	0.9	1.0	0.6	6.0	4	
W. M. HAM MILE 167.2R. PUMP, 1-1″										
1924								0.2	1	
1925			1.1	0.7	1.1			2.9	10	
1926										
1927										
1928										
HAMMON STOCK RANCHES[3] MILE 169.8R. PUMP, 1-8″										
1924	67	165	172	188	194	82		868	80	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
HAMMON STOCK RANCHES[3] MILE 170.7R. PUMP, 1-6″										
1924			11					11	40	
1925	No diversion									
1926	No diversion									
1927				10				10	18	
1928	No diversion									

[1] Additional water was obtained for the rice from the A. N. Lewis pump as follows: July, 690 acre-feet; August, 566 acre-feet.
[2] Formerly Bank of Tehama (I. W. Griffen).
[3] Listed as Doyle Ranch, 1924 and 1925; Finnell Land Co., 1926 and 1927.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
HAMMON STOCK RANCHES[1] MILE 171.2R. PUMP, 1-8"										
1924	8	14		16	15			53	100	
1925	No diversion									
1926	No diversion									
1927				9	21			30	25	
1928			1	23				24	40	
HAMMON STOCK RANCHES[1] MILE 174.2R. PUMP, 1-8"										
1924	52	81	79	87	79	19		397	90	
1925			15	74	60			149	90	
1926	No diversion									
1927	No diversion									
1928	No diversion									
GEORGE HANSEN[2] MILE 117.8R. PUMPS, 1-6," 1925; 1-10," 1928										
1924										
1925				48				48	(3)	
1926	No diversion									
1927	No diversion									
1928				130				130	130	
HARBINSON BROTHERS MILE 5.05R. PUMP, 1-14"										
1924	11	13	14	20	4	12	6	80	90	
1925		84	142	62	30	24		342	Stock and pasture	
1926		265	87	182		20		554	134	
1927		213	243	6	46	24	3	535	80	
1928		192	236	69			8	505	90	

HARRIS AND DEMPSTER[5] AND J. L. HENDERSON MILE 240.5L. PUMP, 1-10″										
1924	147	216	151	232	183	44		973	140	
1925		18	123	127	20		8	296	130	
1926		8	182	137	123	53		503	115	
1927			18	26	16	1		61	15	
1928		21	7	20	11	7		66	10	
HASKINS BROTHERS[6] MILE 218.0L. PUMP, 1-4″										
1924	17	21	20	9			24	91	45	
1925				7	4			11	45	
1926				19	8	8		35	45	
1927			15	16			5	36	30	
1928			13	15				28	30	
JULIUS HAUSER RANCH MILE 13.1R. PUMP, 1-12″										
1924										
1925					44			44	20	
1926		74	174	128	94	106	8	584	112	
1927			188	174	141	118	10	631	112	
1928		22	176	53	139	77		467	86	
HERSHEY ESTATE[7] MILE 26.95R. PUMP, 1-18″										
1924										
1925										
1926				321	624	389		[8]1,334		350
1927			216	388	130			[8]734		350
1928	No diversion									
P. J. HIATT MILE 48.7L. PUMP, 1-20″										
1924	199	324	2	516	107			1,148	40	
1925					387			387	40	
1926		929	970	911	822	236		3,868	50	200
1927			216	288	326			830	250	
1928	13	17	138	280				448	70	

[1] Listed as Doyle Ranch, 1924 and 1925; Finnell Land Co., 1926 and 1927.
[2] Butte City Ranch prior to 1928.
[3] See Butte City Ranch, Mile 115.8R.
[4] In May and June approximately 300 acre-feet of diversions here shown for those months were used on Reese and Greer lands. See Mile 4.65R.
[5] Previous to 1928 listed as Harris Bros. (Harris and Dempster).
[6] Previous to 1928 listed as J. L. Haskins.
[7] Butte Farms Land Co., 1926.
[8] Additional water obtained from flood water storage in Grays Bend (old river channel) and water pumped by No. 1 plant of R. D. 730 into Grays Bend.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
H. L. HILL Jr. (W. R. TAYLOR) MILE 11.1R. PUMP, 1-14''										
1924	87	328	302	278	89	340		1,424	290	
1925			45	209	254		72	580	345	
1926	No diversion									
1927	No diversion									
1928	No diversion									
HINES RANCH MILE 62.3R. PUMP, 1-10''										
1924		16	18			12		46	25	
1925					23			23	25	
1926				5	9	4		18	15	
1927				15	8			23	18	
1928				17	10			27	18	
D. L. W. HOFFMAN MILE 65.7L. PUMP, 1-12''										
1924	1	106	38	77	43	47		312	103	
1925					213	91	45	349	100	
1926					119			119	111	
1927			42	54	37	34	22	189	111	
1928		21	87	91	42	38		279	140	
A. HOLECEK MILE 152.2R. PUMP, 1-6''										
1924										
1925										
1926										
1927		2.8		4.5	3.3	0.6		11.2	45	
1928		1		11	12	4		28	30	

HOUCHINS, HOFFMAN, BECKLEY AND RITCHEY MILE 70.4R. PUMP, 1-20'										
1924	176	182	170	124	108	144	30	934	131	
1925		395	644	134				1,173	560	
1926	No diversion									
1927	No diversion									
1928			43	180	3			226	183	
R. R. HOWELL[1] MILE 193.5L PUMPS, 1-1½," 1-4"										
1924										
1925	No diversion									
1926	No diversion									
1927								(1)	25	
1928	2	2	4	4	4	4	3	23	6	
W. A. HUNAEUS MILE 216.4L. PUMP, 1-3"										
1924		3	2					5	7	
1925	No diversion									
1926			1.1	3.5				4.6	8	
1927				2.9	1.3			4.2	3	
1928			3	3	1			7	9	
A. C. HUSTON MILE 31.5R. PUMP, 1-12"										
1924										
1925		4	47	61		18	16	146	17	
1926		29	40	24	13	7		113	80	
1927		7	5	31	11	14	7	75	38	
1928			19	20	11	11		61	25	[2]22
JACINTO IRRIGATION DIST.[3] MILE 154.8R. PUMPS*										
1924	1,390	1,940	1,830	2,180	1,730	1,280	315	10,665	3,000	
1925		481	1,657	1,891	1,769	734	440	6,972	2,500	
1926		1,043	1,847	1,960	1,335	1,075	413	7,673	3,203	
1927	163	1,665	1,724	2,204	1,905	992	800	9,453	4,088	
1928	30	1,549	1,884	2,149	1,973	1,047	554	9,186	2,685	

*See Glenn-Colusa Irrigation District.

[1] Not listed previous to 1928, but owner states plant was operated in 1924 and 1927, in the latter year for 25 acres of alfalfa.

[2] Irrigated from Kendall Ranch Plant. See Mile 32.00R.

[3] Receives water through same plant as Glenn-Colusa Irrigation District.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
DR. E. V. JACOBS MILE 77.9L. PUMP, 1-12″										
1924	85	183	61	109	17	14		469	270	
1925			1	20		2		23	15	
1926	No diversion									
1927	No diversion									
1928	No diversion									
JACOBSEN AND O'ROURKE MILE 87.6L. PUMP, 1-10″										
1924		38	60		18	26	6	118	30	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
MARTIN JENSEN MILE 131.5R. PUMP, 1-6″										
1924	5	2						7	7	
1925	No diversion									
1926	No diversion									
1927	Plant removed									
1928										
JOHNSON AND COATES MILE 221.0R. PUMP, 1-10″										
1924		81	95	81	70	40		367	460	
1925		91	236	83	227	140		777	350	
1926			181	79		84	24	368	400	
1927		3	58	158	42	2		263	460	
1928		55	274	163	47	6	9	554	460	

W. E. JOHNSON MILE 196.5L. PUMP, 1-4″										
1924			20					20	25	
1925				3				3	25	
1926			9	10				19	27	
1927			6	15				21	27	
1928		6	16	7				29	27	
C. W. JONES[1] MILE 2.05L. PUMP, 1-8″										
1924			64	57	28	2	9	160	183	
1925			148	194	8			350	130	
1926		2	45	30	8			85	60	
1927			13	44				57	60	
1928		1	48	13	6			68	100	
KENDALL RANCH (UPPER) MILE 32.0R PUMPS, 1-10″, 1-18″										
1924		15	54	22	27			118	20	
1925			33	40	29		19	121	80	
1926		19	40	17	15	21		112	96	
1927		338	1,116	1,146	602	438		3,640	80	464
1928		1,111	1,704	1,779	1,731	756		7,081	60	550
KENDALL RANCH (LOWER) MILE 30.6R. PUMP, 1-7″										
1924										
1925										
1926										
1927			7					7	30	
1928	No diversion									
ANNA KERN MILE 126.5R. PUMP, 1-1½″										
1924										
1925										
1926		0.1	0.1					0.2	1	
1927		0.1	0.4	0.2				0.7	1	
1928	No diversion									

[1] G. D. Jones, 1924, 1925 and 1926.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
F. W. KIESEL MILE 10.25L. PUMP, 1-14″										
1924	140	570	510	250	250	250	100	2,070	570	
1925			203	273	212	115		803	570	
1926	154		48	392	383	69		1,046	574	
1927			95	259	531	146		1,031	427	
1928		22	250	232	522	85		1,111	243	
GEO. W. KIRKPATRICK [1] MILE 83.3L. PUMP, 1-14″										
1924		20		6	23			49	40	
1925	No diversion									
1926				64				64	75	
1927		14	43	30				87	75	
1928			48	13				61	75	
W. F. KLEWE MILE 100.8L. PUMP, 1-20″										
1924	13	198						211	160	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
MERRILL KNIGHT MILE 146.7L. PUMP, 1-3″										
1924			4					4	0.5	
1925	No diversion									
1926			1.7	1.2	0.3			3.2	3	
1927			0.8	0.2	0.1			1.1	1	
1928			0.4	0.2				0.6	1	

KNOX AND LEISER										
MILE 33.75L. PUMP, 1-12″										
1924	24	70	79	46	98	22	12	351	120	
1925			51	52	27			130	90	
1926		11	52	15	55			133	64	
1927			50	35	30	14		129	120	
1928		33	43	34	17	12		139	126	
R. A. LAMB										
(LAMB BROTHERS)										
MILE 59.8L. PUMP, 1-12″										
1924										
1925			34	54	16			104	65	
1926		6	66	68	20			160	100	
1927			56	22	17			95	130	
1928		11	52	13	19	5		100	130	
C. L. LEONARD										
MILE 126.3R. PUMP, 1-12″										
1924	37	15	28	14	28	26	19	167	165	
1925			37	98	116	24		275	165	
1926		37	23	79	30	28	40	237	145	
1927		67	35	29	21	26	29	207	145	
1928	5	71	80	53	50	23	22	304	145	
M. LEONARDINI ESTATE										
(GRAF AND GRAF)										
MILE 242.0L. PUMP, 1-8″										
1924		28	40	44	49	49		210	60	
1925				94	96	38		228	60	
1926	3	8	82	37	21	15		166	62	
1927			60	59	65	31		215	70	
1928		20	84	50	75	47	3	279	55	
A. N. LEWIS										
MILE 95.6L. PUMP, 1-16″										
1924	167	765		238	348		154	1,672	334	
1925					526			526	300	
1926			231	[2]690	[2]566			[2]1,487	100	
1927	No diversion									
1928	No diversion									

[1] J. M. Gomes, 1924 and 1925.
[2] 1256 acre-feet, July and August diversions, were used on Bridget Graham estate for rice acreage.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
LINDO NURSERY MILE 130.7R. PUMP, 1-3″										
1924			2	2	2	2		8	2	
1925	No diversion									
1926										
1927										
1928										
A. LINGGI MILE 18.45L. PUMP, 1-12″										
1924			23		11	52		86	40	
1925					148			148	40	
1926			43	118	40			201	70	
1927			39	97	32	54		222	75	
1928			136	160	71	101		468	100	
JAKE LOCOVITCH MILE 87.7L. PUMP, 1-3″										
1924	0.1	0.8	0.1	0.2	0.7			1.9	2	
1925										
1926										
1927										
1928										
K. L. LOVDAL MILE 5.7R. PUMP, 1-10″										
1924	150	35	13	60	18	197	2	475	200	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928			89	26				115	112	

MAAS BROTHERS MILE 154.6R. PUMP, 1-5″										
1924										
1925										
1926										
1927						1.7	1.2	2.9	1	
1928			2.5	1.1	2.1	1.5	0.4	7.6	16	
F. L. MARTIN AND A. B. CARTER (F. J. STAHL) MILE 7.80L. PUMP, 1-10″										
1924	24	43	14	35	40	14		170	90	
1925			67	61	39	15	24	206	93	
1926	14	45		20	5			84	35	
1927			50	9				59	40	
1928		22	56	8	9			95	40	
A. MARTY MILE 7.90R. PUMP, 1-8″										
1924		3	15	13	26	7	24	88	50	
1925					57	8	2	67	50	
1926				49	48	8		105	50	
1927				47	28	10		85	[1]400	
1928		15	47	37	45	20	15	179	[1]400	
M. MARTY MILE 8.30R. PUMP, 1-10″										
1924		240	185	232	190	155	19	1,021	250	
1925			50	248	177	96		571	250	
1926			157	278	224	168		827	250	
1927			110	254	248	186	27	825	[2]	
1928		95	227	183	240	76	19	840	[2]	
MAXWELL IRRIGATION DIST. MILE 102.8R PUMPS, 2-18,″ 2-30,″ 1-36″										
1924	950	2,700	2,970	1,910	1,470	1,770	1,270	13,040	1,466	[3]1,820
1925		1,999	1,220	4,181	809	1,215		9,424	60	[3]1,500
1926		3,477	2,664	1,729	1,130	576	1,376	10,952	10	[4]1,609
1927	249	1,985	1,665	1,606	1,315	1,124		7,944	10	862
1928	549	3,256	2,399	2,725	2,461	581		11,971	10	1,050

[1] This is the total acreage irrigated from this plant and the M. Marty plant at Mile 8.3R.
[2] See A. Marty, Mile 7.90R.
[3] Irrigated from both River and Colusa Trough plants.
[4] Includes 955 acres irrigated from both River and Colusa Trough.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversons in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
MEEK ESTATE MILE 34.2R PUMPS, 2-16,'' 1-10''										
1924	1,180	1,770	1,880	1,720	1,610	925	180	9,265	30	1,150
1925	464	1,253	1,822	2,276	1,661	826	----	8,302	[1]173	1,200
1926	70	1,032	1,788	1,826	1,915	581	----	7,212	[1]113	825
1927	579	2,663	2,314	2,404	2,331	667	----	10,958	[1]113	1,150
1928	624	2,305	2,494	2,526	2,431	759	----	11,139	15	850
WM. MENZEL MEAT CO. MILE 240.2L. PUMP, 1-12''										
1924	----	----	----	----	----	----	----	----	----	----
1925	----	----	----	----	----	----	----	----	----	----
1926	----	34	17	79	116	15	----	261	65	----
1927	----	71	71	43	103	59	----	347	75	----
1928	----	167	70	153	160	139	----	689	75	----
MERIDIAN FARMS WATER CO. No. 6[2] MILE 67.4L. PUMP, 1-14''										
1924	----	----	----	----	----	----	----	----	----	----
1925	----	----	----	----	----	----	----	----	----	----
1926	----	----	----	----	----	----	----	----	----	----
1927	----	33	69	180	75	21	----	378	129	----
1928	----	39	85	123	53	15	----	315	([3])	([3])
MERIDIAN FARMS WATER CO. No. 5[2] MILE 68.81L. PUMP, 1-12''										
1924	----	----	----	----	----	----	----	----	----	----
1925	----	----	----	----	----	----	----	----	----	----
1926	----	48	290	376	347	60	----	1,121	([3])	----
1927	----	36	327	276	316	37	----	992	149	----
1928	----	151	320	332	238	140	----	1,181	([3])	([3])

MERIDIAN FARMS WATER CO. No. 4[2] MILE 71.1L. PUMP, 1-24''										
1924	2,100	2,400	2,180	2,260	2,140	1,140		12,220	1,176	1,163
1925		508	555	954	973	400		3,390	(3)	
1926		40	1,560	2,472	1,600	307		5,979	(3)	(3)
1927	31	316	2,255	2,210	582	156	24	5,574	1,658	
1928			809	1,110	772	297		2,988	(3)	(3)
MERIDIAN FARMS WATER CO. No. 3[2] MILE 74.5L. PUMP, 1-20''										
1924	628	64	489	158	75	15		1,429	460	
1925		6	744	365	437	36	42	1,630	(3)	
1926	55	69	228	402	180	15		949	(3)	
1927		147	396	265	357	42	13	1,220	592	
1928			559	376	441	184		1,560	(3)	
MERIDIAN FARMS WATER CO. Nos. 1, 2[2] MILE 80.0L PUMPS, 1-18,'' 1-24''										
1924		1,690	1,730	1,671	1,670	1,070		7,831	1,454	590
1925		85	1,423	2,386	2,135	909	50	6,988	[4]5,650	
1926		200	1,557	3,022	1,846	392		7,017	[4]4,621	
1927		807	1,941	2,346	1,326	720	124	7,263	2,468	
1928		1,012	2,953	2,534	1,875	1,197		9,571	[4]4,090	[4]335
C. H. MERKELEY, ESTATE (MERKELEY BROS.) MILE 5.3R. PUMP, 1-8''										
1924	1		43	27				71	40	
1925	No diversion									
1926			9	5				14	60	
1927	No diversion									
1928			11					11	60	

[1] 113 acres alfalfa irrigated for River Farms Company.
[2] Alameda Sugar Company prior to 1928.
[3] See Meridian Farms Water Company Nos. 1 and 2, Mile 80.0L.
[4] This is the total acreage served from all Meridian Farms Water Company river plants.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
KATE MERKELEY MILE 9.15R. PUMP, 1-2″										
1924										
1925										
1926										
1927	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	Domestic	
1928	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	Domestic	
KATE MERKELEY MILE 9.20R. PUMP, 1-6″										
1924										
1925	No diversion									
1926	No diversion									
1927				4.2				4.2	20	
1928	No diversion									
M. F. MERKELEY[1] MILE 15.15R. PUMP, 1-8″										
1924										
1925	No diversion									
1926					84			84	40	
1927				10	1			11	15	
1928	No diversion									
J. M. MILLER MILE 56.65R. PUMP, 1-12″										
1924		52	71	24	41	6		194	60	
1925				44	101			145	50	
1926	No diversion									
1927	No diversion									
1928	No diversion									

MILE 36.7L. PUMP, 1-5″										
1924										
1925					24			24	40	
1926			15	1				16	40	
1927	No diversion									
1928	No diversion									
E. B. NOBLE (J. J. SILVA) MILE 184.5R. PUMP, 1-14″										
1924	41	93	115	153	176	145		723	50	
1925				55	37	35		127	50	
1926			40	51	66	39		196	90	
1927			19	29	36	8	30	122	100	
1928		7	14	31				52	100	
NORTHERN MUTUAL WATER CO.[2] MILE 19.6L. PUMP, 1-36″										
1924	971	1,990	2,040	2,140	2,160	933	6	10,240	93	1,193
1925		1,508	2,327	3,005	3,343	3,093	396	13,672		1,836
1926		884	2,839	2,810	3,242	1,283		11,058	35	1,990
1927		700	1,100	2,958	3,052	2,444	325	10,579		1,630
1928	1,100	3,200	2,563	2,915	3,489	378		13,645	607	1,693
W. NORTHRUP[3] (V. V. APPERSON) MILE 233.0L PUMPS, 1-6,″ 1-4″										
1924										
1925										
1926		11.9	12.6	5.4	5.4	3.4		38.7	26	
1927			6.4	7.2	3.6			17.2	10	
1928			5.7					5.7	10	
J. F. NUNAS (LOWER) MILE 215.5R. PUMP, 1-7″										
1924		24	24	24	24			96	[4]21	
1925				15	14			29	[4]23	
1926				48	17	12		77	30	
1927					49	78	21	148	80	
1928	No diversion									

[1] Listed as A. A. Merkeley in 1925.
[2] Listed as Natomas Company of California in 1924 and 1925.
[3] Smith and George prior to 1928.
[4] Combined irrigated acreage for both Nunas pumps, Mile 215.5R and 216.0R.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
J. F. NUNAS (UPPER) MILE 216.0R. PUMP, 1-3″										
1924	4	4	4	4	4	4		24	(1)	
1925			2.5	1.6	1.6	1.6		7.3	(1)	
1926	No diversion									
1927	No diversion									
1928			4	14	8			26	18	
OAKLAND PRUNE CO. MILE 86.1R. PUMP, 1-12″										
1924	110	35	71	25				241	95	
1925			36	23			35	94	95	
1926			100				29	129	100	
1927		46						46	92	
1928		40						40	92	
PARROTT-PHELAN ESTATE MILE 141.5L. PUMPS, 5-24″										
1924	441	1,360	4,110	4,780	5,040	1,940	562	18,233	911	1,250
1925			870	4,744	4,380	3,313		13,309	560	1,500
1926			1,801	3,806	4,346	1,720	68	11,741	926	1,278
1927		1,316	126	1,831	3,592	3,564		[2]10,429	487	1,496
1928				1,578	2,164	1,000		[2]4,742	175	1,200
R. G. PEARSON AND P. S. DRIVER (C. M. OWEN AND F. C. JONES) MILE 9.80L. PUMP, 1-14″										
1924		208	155	225	270			858	410	
1925			71	97	160			328	384	
1926			68	195	81	118		462	167	
1927			39	151	116			306	103	
1928			179	147	87			413	252	

J. F. PECK MILE 86.6L. PUMP, 1-18''										
1924	40	153	42	39	78	20		372	110	
1925			88	26	112			226	110	
1926			80	134	25			239	60	
1927			91	31	6			128	90	
1928			22	113		6		141	129	
W. E. PINNEY MILE 94.8R. PUMP, 1-12''										
1924										
1925	No diversion									
1926			27	22				49	80	
1927		93	6					99	80	
1928		47	66	26				139	90	
POIRIER AND SPERRY MILE 98.6L. PUMP, 1-15''										
1924	45	12	57					114	57	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
PRINCETON-CODORA-GLENN IRRIGATION DISTRICT MILE 112.4R. PUMPS, 3-24''										
1924	1,380	3,010	3,790	2,800	752			11,732	[3]3,785	[3]864
1925		2,241	2,925	3,010	3,269	879		12,324	[3]3,086	[3]1,761
1926	142	5,278	5,739	5,575	3,586	166		20,486	[3]2,698	[3]2,694
1927	747	4,815	4,067	5,381	4,466	407		19,883	[3]2,648	[3]3,311
1928	834	3,313	3,402	3,943	2,290	99		13,881	[3]2,763	[3]2,597
PRINCETON-CODORA-GLENN IRRIGATION DISTRICT MILE 123.9R. PUMPS, 3-24''										
1924	2,740	3,700	3,430	4,980	4,900	3,940	846	24,536	(4)	(4)
1925	1,370	5,950	5,807	6,133	6,085	5,613	926	31,884	(4)	(4)
1926	2,335	4,604	4,878	4,991	4,969	3,397	907	26,081	(4)	(4)
1927	4,064	6,127	5,683	5,640	5,627	3,934	1,747	32,822	(4)	(4)
1928	3,165	6,755	5,986	5,835	5,835	3,364	1,608	32,548	(4)	(4)

[1] See Nunas plant at Mile 215.5R.
[2] Additional water for acreage shown was obtained from Butte Creek.
[3] This is the combined acreage for both District plants, 112.4R and 123.9R.
[4] See district plant at Mile 112.4R.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
PROVIDENT IRRIGATION DISTRICT MILE 124.2R PUMPS, 4-42", 1-36"										
1924	3,800	20,900	19,600	20,200	18,200	10,700	784	94,184	3,925	7,031
1925		14,985	20,188	21,273	19,430	16,184	2,037	94,097	380	8,160
1926	4,460	21,689	25,134	22,611	18,674	7,889	548	101,005	66	8,792
1927	5,223	22,723	21,491	21,449	19,467	8,152	513	99,018	95	8,035
1928	4,982	18,821	14,764	15,121	14,858	5,739		[1]74,285	397	5,186
PROVIDENT IRRIGATION DISTRICT MILE 154.8R[2] PUMPS, SEE GLENN-COLUSA IRRIGATION DISTRICT										
1924										
1925										
1926										
1927										
1928	164	5,614	5,659	5,133	4,163	1,771		22,504	65	2,812
ANTHONY RADEMACHER MILE 116.1L PUMP, 1-2½"										
1924										
1925										
1926			0.7					0.7	0.5	
1927		0.5	0.2	0.2	0.5	0.1		1.5	3	
1928		0.8	0.9	0.5	0.1	0.4	0.6	3.3	3	
RECLAMATION DISTRICT 108 (BOYER BEND) MILE 56.4R PUMPS, 1-30", 1-18"										
1924	63	85	627	680	112			1,567	600	
1925			55	825	235			1,115	637	
1926		1,937	2,953	2,665	2,989	952		11,496	722	596
1927	508	3,285	3,576	3,344	2,991	2,601	289	16,594	711	1,238
1928		215	447	467	200	183		1,512	717	

(STEINER BEND) MILE 59.85R PUMPS, 1-16", 1-14"										
1924										
1925										
1926		1,284	1,375	1,777	1,721	1,282		7,439		863
1927		1,347	1,525	1,682	1,768	812		7,134		396
1928	No diversion									
RECLAMATION DISTRICT 108 (TYNDALL MOUND) MILE 51.1R PUMPS, 1-36", 2-24"										
1924										
1925	No diversion									
1926	No diversion									
1927		4,998	7,295	9,618	8,658	7,718	3,094	41,381		2,993
1928	No diversion									
RECLAMATION DISTRICT 108 (WILKINS SLOUGH) MILE 63.2R. PUMPS, 5-42"										
1924	5,140	5,490	5,130	4,410	2,900	2,580		25,650	2,315	3,764
1925	907	3,646	4,845	5,551	5,339	3,465		23,753	1,252	1,994
1926	2,824	5,909	11,843	11,215	10,307	3,425		45,523	120	4,904
1927	3,192	8,544	8,106	9,879	9,206	5,243	682	44,852	155	3,910
1928	7,011	9,547	8,427	7,494	7,205	352		40,036	504	2,945
RECLAMATION DISTRICT 1004 MILE 112.1L. PUMPS, 1-24" 1-30", 1-50"										
1924	738	1,000	187	507	445	3,990	585	7,452	1,700	
1925		802	5,270	5,711	5,444	5,228		22,455		2,500
1926	1,800	7,253	9,420	9,548	9,006	2,663	1,298	40,988	105	3,772
1927	524	5,330	3,990	4,827	5,042	2,643	371	22,727	15	1,666
1928	1,325	5,358	7,609	7,250	6,582	2,652	310	31,086	385	1,944
HAYWARD REED MILE 3.55R. PUMP, 1-16"[3]										
1924	194	133	204	56	183	36		806	[4]350	
1925			216	69	43			328	[4]290	
1926		48	114	47	115	15	4	343	[4]290	
1927			246	228	187	45		706	290	
1928		153	426	30		4		613	335	

[1] Additional diversions were obtained through Glenn-Colusa I. D. plant. See Mile 154.8R.

[2] Water for Glenn-Colusa, Jacinto and Compton-Delevan Irrigation Districts is also diverted at this pumping plant.

[3] 15 inch prior to 1927.

[4] Total acreage for both Reed plants, Mile 3.55R and 3.60R.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
HAYWARD REED MILE 3.60R. PUMP, 1-10″										
1924	32	40	60	75	74	25		306	(1)	
1925			34	80	68			182	(1)	
1926		40	133	104	171	14		462	(1)	
1927	Plant removed									
1928										
REESE AND GRIER MILE 4.65R. PUMP, 1-7″										
1924	1	55	67	19	18	23	1	184	100	
1925			16					16	12	
1926	22	66	116	9				[2]213	260	
1927	2	51	70	59	21			[2]203	275	
1928	14	77	119	16	4	10		[2]240	275	
REESE ESTATE (LOUIS ASHWANDAN) MILE 10.75R. PUMP, 1-12″										
1924	4	22	13	6	72	144		261	80	
1925			49	50	67	37	38	241	80	
1926		23	159	154	33	104		473	88	
1927			72	108	26	119	20	345	88	
1928			193	82	82	32		389	88	
C. E. REISCHE MILE 79.0L. PUMP, 1-10″										
1924	60	58	75	61	48	37		339	320	
1925		10	73	70	40	19	3	215	121	
1926		18	80	46	45	8		197	116	
1927		43	68	77	52	15		255	116	
1928	7	18	90	72	35	23		245	133	

RIVER FARMS COMPANY (GARDEN PUMP) MILE 36.95R. PUMP, 1-2″										
1924										
1925										
1926	0.3	1.3	0.8	1.3	0.6	0.4		4.7	2	
1927	1.0	1.0	0.8	0.9	1.0	0.1	0.8	5.6	2	
1928	4.2	6.1	2.6	1.6	0.9	0.4		15.8	3	
RIVER FARMS COMPANY (TOWNSITE) MILE 34.25R PUMPS, 1-24″, 1-26″, 1-20″										
1924	1,960	3,350	3,800	3,600	3,600	429		16,739	603	1,850
1925		2,183	2,616	2,839	2,947	1,304		11,889	605	1,854
1926		373	2,421	652	940	78		4,464	1,453	
1927		1,265	983	1,720	997	478		5,443	1,957	
1928		1,440	1,554	517	777		824	5,112	1,637	
RIVER FARMS COMPANY (RECLAMATION DISTRICT 2047 PLANT) MILE 43.1R. PUMPS, 2-50″										
1924	9,050	13,200	12,500	13,200	11,000	81		59,031		8,000
1925	No diversion									
1926										
1927	No diversion									
1928	3,550	5,045	6,115	6,585	7,242	927		29,464		2,945
RIVERSIDE MUTUAL WATER COMPANY MILE 6.10L. PUMPS, 2-18″										
1924	459	1,670	1,850	1,830	1,160	1,170	105	8,244	2,652	
1925			595	1,920	1,348	683	25	4,571	1,998	
1926		167	1,456	1,252	877	217		3,969	1,869	
1927		118	1,108	1,330	929	156		3,641	1,473	
1928		338	1,263	1,083	983	148		3,815	1,398	
ROBERTS DITCH COMPANY MILE 90.7R. PUMPS, 2-20″										
1924	738	733	1,030	940	775	700	111	5,027	1,500	100
1925			925	756	701	254	89	2,725	650	
1926	56	440	844	772	532	410	33	3,087	900	
1927		393	571	609	429	265	56	2,323	600	
1928	39	444	614	653	460	251	28	2,489	600	

[1] See plant at Mile 3.55R.
[2] Additional water was obtained in May and June via Harbinson plant. See mile 5.05R.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
P. M. ROONEY MILE 146.9L. PUMP, 1-5''										
1924			34					34	30	
1925			31	49				80	30	
1926			23	10				33	25	
1927			24	14				38	25	
1928			31	30				61	25	
CITY OF SACRAMENTO MILE 0.8L PUMPS, 3-29'', 1-18''										
1924	2,130	2,510	2,580	2,610	2,460	2,210	1,810	16,310	Municipal	
1925	1,561	1,831	2,373	2,669	2,551	2,181	1,974	15,140	Municipal	
1926	1,921	2,204	2,609	2,662	2,504	2,173	1,738	15,811	Municipal	
1927	1,966	2,430	2,595	3,026	2,952	2,582	2,349	17,900	Municipal	
1928	2,013	2,667	3,044	3,210	3,051	2,548	2,058	18,591	Municipal	
SACRAMENTO VALLEY SUGAR COMPANY MILE 151.0R PUMPS, 1-12'', 1-18''										
1924		63	744	1,000				1,807	850	
1925				19	207	363		589	Industrial	
1926			156	93	141	15		405	220	
1927	No diversion									
1928	No diversion									
J. E. SCHARSCH MILE 130.8R. PUMP, 1-1½''										
1924	0 2	0 2	0 2	0 2	0 2	0 2		1.2	0 25	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									

LLOYD SCOGGINS										
MILE 86.8L. PUMP, 1-10″										
1924	22		59	34	6	39	2	162	45	
1925					43			43	53	
1926			51	28	23			102	50	
1927				49				49	50	
1928	No diversion									
J. H. SCOTT										
MILE 35.6L. PUMP, 1-7″										
1924	2	34	26	9	13	22	2	108	30	
1925			13	26	25	19		83	30	
1926			48	8	15			71	30	
1927			52	23	35			110	30	
1928		15	60	27	22			124	29	
R. S. SEYDEL[2]										
MILE 5.25R. PUMP, 1-8″										
1924	1	65	79	27	120	4	1	298	160	
1925			9	20	50	53		132	70	
1926				60				60	40	
1927		5	69	65				139	77	
1928		20	68	67				155	138	
J. J. SILVA[3]										
MILE 185.3R. PUMP, 1-10″										
1924										
1925										
1926										
1927										
1928				16		17		33	30	
A. A. SOUSA[4]										
MILE 9.35R. PUMP, 1-14″										
1924	40	132	180	117	119	100	26	714	180	
1925		27	188	157	144	88	24	628	230	
1926			77	168	53	94	14	406	252	
1927			97	163	60	187	29	536	280	
1928		122	167	95	152	142	59	737	300	

[1] 2 pumps operated 1925: 1-5-inch and 1-4-inch.
[2] K. L. Loydal, 1924 and 1925.
[3] New installation 1928.
[4] A. A. Merkeley, 1924 and 1925; Sousa-Santos Company, 1926.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
STAATS, KLEWE AND KILLEBREW[1] MILE 123.8R. PUMP, 1-6″										
1924		30	18	26	7			81	60	
1925	No diversion									
1926						12		12	25	
1927	No diversion									
1928	No diversion									
G. J. STAM MILE 51.2L. PUMPS, 1-24,″ 1-12″[1]										
1924	428	1,160	1,240	444	615	31	17	3,935	800	
1925			151	316	256	214	335	1,272	550	
1926		492	771	981	813	318		3,375	338	160
1927		1,041	1,580	1,850	1,811	1,437	98	7,817	590	820
1928	412	1,644	1,579	1,639	1,567	574		7,415	520	560
EDWARD L. STEEL MILE 115.5L. PUMP, 1-12″										
1924	128	111	111		89	106	16	561	84	
1925			98	34	71	7	71	281	84	
1926		85	19	74	39	59		276	77	
1927		21	24	18	10	40	32	145	40	
1928		2	25	1	10			38	40	
ANTONE STEIDELMEYER[1] MILE 71.9R. PUMP, 1-12″										
1924	22	75	88	105	75	13		378	50	
1925			103	24	20	30		177	50	
1926				109	48			157	75	
1927				55	40			95	45	
1928			62	58	36			156	40	

F. J. STEIDELMEYER AND SONS MILE 80.9R. PUMP, 1-12″										
1924	17	17			32	24		90	40	
1925	No diversion									
1926			3	60	74			137	47	
1927				63	72			135	43	
1928			59	29	34	19		141	45	
H. P. STICE MILE 197.0L. PUMP, 1-8″										
1924			13	20	13	13		59	32	
1925			8	15				23	32	
1926			43	70	40	41		194	70	
1927			40	55	63	27	11	196	65	
1928		20	56	62	77	22		237	72	
ST. JOHNS PARK COMPANY (W. A. YERXA AND SONS) MILE 110.0R. PUMP, 1-12″										
1924				162	102		42	306	166	
1925			156	63	57			276	166	
1926		82	84	89	174		23	452	166	
1927		22	133	130	127			412	166	
1928		139	95	87	22			343	166	
A. J. STONE (STONE AND FALKNER) MILE 112.6L. PUMP, 1-8″										
1924	44	54	45	68	67	77		355	140	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928				81				81	140	
SUTTER MUTUAL WATER CO. (PORTUGUESE BEND) MILE 32.0L. PUMPS, 2-24″										
1924	1,840	3,140	3,110	4,010	3,560	1,280		16,940	409	770
1925		121	1,276	2,093	1,068	360		4,918	440	
1926	766	2,586	2,647	2,934	2,658	857		12,448	1,119	550
1927	94	1,628	1,903	1,530	2,188	890		8,233	997	92
1928	317	1,160	1,522	1,629	1,320	225		6,173	(4)	(4)

[1] Boque-Killebrew and St. Louis, 1924 and 1925.
[2] 12-inch pump used in 1927 only.
[3] Listed as Dale Mumma, 1924; F. J. Steidelmeyer, 1925 and 1926.
[4] See company plant at Mile 63.75L.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
SUTTER MUTUAL WATER CO. (McCUTCHEON RANCH)[1] MILE 39.4L. PUMP, 1-12″										
1924										
1925										
1926			6	19	7			32	35	
1927				46	38			84	87	
1928			14	15				29	80	
SUTTER MUTUAL WATER CO. (STATE RANCH BEND) MILE 40.6L. PUMP, 1-24″										
1924		1,930	338		1,340	549		4,157	3,150	
1925	83	1,094	2,480	2,086	1,853	1,141		8,737	[2]	
1926	527	1,583	2,041	1,921	2,141	593		8,806	[2]	
1927		1,219	2,749	2,790	2,824	1,289		10,871	[2]	
1928		2,763	3,376	3,296	3,234	819		13,488	[2]	
SUTTER MUTUAL WATER CO. (BOZZI AND PRESSENDA) MILE 42.3L. PUMP, 1-8″										
1924										
1925										
1926										
1927										
1928			14	30				44	58	
SUTTER MUTUAL WATER CO. (TISDALE) AND IMPROVEMENT MUTUAL WATER CO. MILE 63.75L. PUMPS, 6-42″										
1924	12,900	21,400	19,200	19,800	18,700	11,700	1,160	104,860	6,653	6,062
1925	2,380	19,135	34,260	30,054	26,997	20,165	2,555	135,546	[3]15,125	[3]7,162
1926	6,614	22,203	27,022	26,488	23,024	6,873		112,224	[3]9,957	[3]7,417
1927	4,458	28,320	32,409	33,860	31,477	17,582	4,109	152,215	[3]10,191	[3]10,672
1928	12,600	28,460	33,133	32,438	30,626	8,155	2,416	148,128	[3]13,412	[3]8,902

G. E. SUTTON										
MILE 196.2R. PUMP, 1-6″										
1924		3	3	3	4	1		14	20	
1925		0.8	1.4	4.6	0.4			7.2	20	
1926	1	3	2	6		1		13	10	
1927		1.2	4.4	4.3	3.7			13.6	7	
1928	0.2	0.2	5.9	6.8	6.5	0.6	1.5	23.5	15	
H. M. SWALLEY										
MILE 2.45L. PUMP, 1-5″										
1924		10	9	16	2			37	38	
1925			4.1	26.1	9.8			40.0	38	
1926		3	6	4	3			16	15	
1927			6.9	2.9	7.8			17.6	15	
1928			12.2	5.4				17.6	38	
SWINFORD TRACT IRRIGATION COMPANY										
MILE 87.7R. PUMP, 1-12″										
1924	38	34	94	68	8	2	40	284	145	
1925			69	57	5		49	180	145	
1926		25	58	6	6		53	148	140	
1927		40	53	6	6		39	144	140	
1928		17	129	13			65	224	140	
TERRILL AND SARTAIN										
MILE 99.2L. PUMP, 1-20″										
1924	142	254	225	184	140	68	29	1,012	680	
1925	No diversion									
1926		763	1,272	1,278	1,178	115	77	4,683	160	520
1927	No diversion									
1928		5	98	350	144	5		607	760	
THOUSAND ACRE RANCH[5] (H. W. KELLER)										
MILE 106.0R. PUMP, 1-14″										
1924	383	299	263	165	95	143	133	1,481	230	
1925			119	117	96		62	394	230	
1926		87	92	79		46	7	311	196	
1927		23	74	49				146	156	
1928		37	117	82				236	187	

[1] Listed as McCutcheon Ranch, 1926 and 1927.
[2] See company plant at Mile 63.75L.
[3] This includes acreage irrigated from this plant and the company plant at Mile 40.6L.
[4] This includes acreage irrigated from this plant and the company plants at Mile 40.6L and 32.0L.
[5] Listed as H. W. Keller, 1924.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
TISDALE IRRIGATION AND DRAINAGE COMPANY MILE 64.4L. PUMP, 1-12″										
1924	60	80	132	71	172	29	3	547	[1]568	
1925		12	32	150	50	31	1	276	[1]825	
1926	67	41	134	229	110	23		604	[1]1,038	
1927		266	494	353	372	327	53	1,865	[1]468	[1]712
1928		419	613	634	727	324		2,717	[1]500	[1]662
TISDALE IRRIGATION AND DRAINAGE COMPANY (WINSHIP PLANT) MILE 67.1L. PUMP, 1-20″										
1924	28	81	82	268	53	56	13	581	(2)	
1925			558	297	1,021	595		2,471	(2)	
1926		20	589	1,340	987	174		3,110	(2)	
1927		1,610	1,709	1,638	1,549	746		7,252	(2)	(2)
1928	534	1,146	1,091	1,104	1,156	389		5,423	(2)	(2)
FRED TRAGANZA MILE 29.7R. PUMP, 1-8″										
1924		8	19	8	19	8		62	35	
1925				19.9	12.8	12.8		45.5	35	
1926			27	3	27	20	21	98	35	
1927		9.3	11.5	17.7	5.3		0.3	44 1	35	
1928	No diversion									
P. L. TRAGANZA AND K. RUSSELL MILE 29.75R PUMP, 1-8″										
1924			4	18	16	13		51	20	
1925				16		11		27	20	
1926			7	14	9	15		45	33	
1927		6	18	8			7	39	30	
1928		3	17	15	10			45	29	

MILE 94.3R PUMPS, 1-15", 1-20"										
1924	735	211	477	337	202	141	292	2,395	385	
1925		7	163	262	75	33	4	544	550	
1926		57	687	308	33	33	8	1,126	460	
1927		548	636	1,085	796	418	15	3,498	394	175
1928		123	131	289	82	53	72	1,050	346	
FRED VAN LEW MILE 35.2L. PUMP, 1-12"										
1924	8	8		8		8		32	13	
1925			0.4	6.0	3.6			10	13	
1926			8		6			14	13	
1927						31		31	13	
1928				27	5			32	6	
E. E. VANN[3] (COFFMAN BROS.) MILE 73.6R.[4] PUMP, 1-12"										
1924	44	39	66	75	39	6		269	115	
1925		12						12	14	
1926	No diversion									
1927			16	396	27			439	102	
1928		19	109	164	12	61		365	110	
OTTO WACKERMAN MILE 65.1R. PUMP, 1-10"										
1924										
1925										
1926			24	17	9	8		58	46	
1927			1	44	20	21	2	88	46	
1928		14	35	10	29	8	17	113	40	
H. WALDECK MILE 8.70R. PUMP, 1-6"										
1924	0.2	4	8	6	4	3		25.2	25	
1925		2.0	18.3	17.7	10.5	9.5	0.5	58.5	25	
1926			16	7	7	7		37	30	
1927		2 3	11.5	15.0	5.4	3.3		37.5	30	
1928	0.2	33.9	31.8	16.9	4 2	5.6	1.5	94.1	40	

[1] Total acreage irrigated from this plant and the company plant (Winship) at Mile 67.1L.
[2] See company plant at Mile 64.4L.
[3] Listed as Duke Young, 1924.
[4] Plant moved from 73.2R to 73.6R in 1927.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 108—Continued

SACRAMENTO RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
SAM WHITE[1] MILE 15.7L. PUMP, 1-6″										
1924			19	59	14	4		96	20	
1925			2	54	55			111	30	
1926			14	8	17	7		46	40	
1927				27	10	17	10	64	40	
1928		11	28	30	18	9		96	40	
EMALINE WILSON (FRUCHTENICHT) MILE 64.90R. PUMP, 1-12″										
1924		60	22	44	22	12	5	165	120	
1925	No diversion									
1926	No diversion									
1927	Plant dismantled									
1928										
A. F. AND R. C. WOHLFROM MILE 101.1R. PUMP, 1-20″										
1924	400	221	88	171	115	27		1,022	130	
1925		3	5	41	4	2	134	189	132	
1926	8	30	235	113	9		163	558	147	
1927		9	102	198	8	19		336	147	
1928		65	162	106	4	2	124	463	147	
G. W. WOODS MILE 79.7L. PUMP, 1-10″										
1924	19	60	14	17	4			114	30	
1925		23	23	1	1			48	34	
1926			41	34	12	3		90	75	
1927		4	58	23	16	3		104	94	
1928		7	65	27	18			117	113	

J. H. YATES MILE 76.1L. PUMP, 1-12″										
1924		66	58	53	45	37		259	40	
1925			36	9	32			77	35	
1926			48	48	37		2	135	62	
1927			39	42	35	3		119	50	
1928		39	39	19	21			118	60	
I. G. ZUMWALT MILE 95.7R. PUMP, 1-12″										
1924	55	28		50			22	155	150	
1925							73	73	150	
1926				74			108	182	100	
1927			74	17			33	124	[2]285	
1928			161	64			40	265	[2]250	
I. G. ZUMWALT MILE 96.8R. PUMP, 1-12″										
1924		96	15		42			153	100	
1925	No diversion									
1926	No diversion									
1927				79				79	([3])	
1928				135				135	([3])	

[1] A. L. Whitney, 1924; R. H. Mayhood 1925 and 1926.
[2] Combined acreage irrigated from Zumwalt plants at Mile 95.7R and Mile 96.8R.
[3] See Zumwalt plant at Mile 95.7R.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 71 to 75, inclusive.

TABLE 109

FEATHER RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
ALICIA MUTUAL WATER COMPANY. *MILE 24.0L PUMPS, 1-20", 1-16"										
1924	396	1,400	1,070	1,400	1,480	1,310		7,056	690	450
1925		340	1,290	1,542	1,438	831		5,441	680	385
1926		818	1,214	1,190	1,149	444		4,815	762	400
1927	201	1,805	1,540	2,344	1,386	910	111	8,297	1,166	800
1928		1,169	1,808	1,881	1,510	396		6,764	645	650
A. P. BARBA (JOHN BETTENCOURT) MILE 47.9L. PUMP, 1-12"										
1924										
1925			67	32	26	42		167	40	
1926			43	47	35			125	40	
1927			65	14	47	10		136	75	
1928			80		53	4		137	60	
MANUEL A. BARBA (J. E. DAVIS) *MILE 43.7L; H. SI. 1.25L PUMP, 1-8"										
1924										
1925		4	22	27	35	41		129	30	
1926		26	24	29	31	26		136	50	
1927		13	25	22	45	6	2	113	56	
1928		3	14	15	19	13		64	30	
E. F. BIGGS (WM. LUIZ) MILE 48.3L. PUMP, 1-10"										
1924										
1925			35	189	142	62		428	100	
1926			78	26	67			171	165	
1927			81	183	87	69		420	322	
1928		3	124	149	130			406	300	

BLOWER BROTHERS MILE 52.1L. PUMP, 1-9″										
1924										
1925					94	22	22		138	66
1926		23	24		41	22			110	95
1927			76		31	41			148	120
1928		46	41		30	37	16		170	124
G. H. BOGUE MILE 53.1R. PUMP, 1-6″										
1924										
1925		4	28		14	12			58	25
1926		8	6		22	6	8		50	20
1927			5		35	11	2	2	55	30
1928		2	25		13	17	3		60	40
BUDH SINGH MILE 54.7R. PUMP, 1-8″										
1924										
1925										
1926			90		49	22	6	8	175	33
1927			18		80	27	10		135	33
1928			52		27	42	15		136	50
RALPH BUTLER MILE 63.7R. PUMP, 1-5″										
1924										
1925					12	12			24	67
1926	No diversion									
1927	No diversion									
1928	No diversion									
J. E. CARRICO MILE 57.0R. PUMP, 1-8″										
1924										
1925										
1926			16		24				40	19
1927		6	23		66	8	4		107	35
1928					33	4	12		49	8

*Mileage along river above its mouth.
[1] 16 inch pump was added in 1927.
[2] Plant is on Honcut Slough which is tributary to Feather River at Mile 43.7L.
NOTE.—Only a few diversions were listed in 1924. Many listed initially in 1925 and later years probably operated in 1924.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 80 to 84, inclusive.

TABLE 109—Continued

FEATHER RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
R. CATLETT MILE 3.13L. PUMP, 1-8″										
1924	30	120						150	80	
1925			33	18	46	2	5	104	70	
1926	No diversion									
1927	No diversion									
1928	No diversion									
FRANK DUTRA MILE 52.9R. PUMP, 1-6″										
1924										
1925										
1926				12	24	9		45	30	
1927				14	7	18		39	30	
1928				11	23	16	6	56	40	
EMMA C. EAKLE (E. A. SWITZER) MILE 58.1R. PUMP, 1-8″										
1924										
1925			7	32				39	35	
1926			36	30	1			67	55	
1927		10		50	7			67	47	
1928	No diversion									
FEATHER RIVER WATER COMPANY MILE 16.35R. PUMP, 1-14″										
1924										
1925										
1926			72	377	123			572	306	
1927			152	324	288	8		772	276	
1928		158	174	226	132			690	275	

GARDEN HIGHWAY MUTUAL WATER COMPANY[1] MILE 13.1R PUMPS, 1-20", 1-24"										
1924		989	668	580	526	385		3,148	1,400	
1925			686	1,113	1,135	394		3,328	1,490	
1926		99	1,237	1,696	1,070	534	175	4,811	2,127	
1927		1,114	1,117	882	966	578	15	4,672	1,577	545
1928	230	880	1,837	1,787	1,535	594		6,863	1,306	366
J. F. HARRIGER MILE 51.1L. PUMP, 1-7"										
1924										
1925			26	28	24		13	91	63	
1926			20	19	29	1		69	74	
1927			45	50	25	16	6	142	83	
1928		12	38	24	31	12		117	70	
HENRY HASELBUSCH MILE 57.9R. PUMP, 1-8"										
1924										
1925			17	45	4			66	52	
1926		16	38	49	15			118	76	
1927		24	24	46	10			104	62	
1928		5	21	39	8			73	65	
HEARST ESTATE (SUNICAL PACKING COMPANY) MILE 55.1L. PUMP, 1-14"										
1924										
1925		27	191	162	150	75		605	300	
1926		23	214	198	221	15		671	400	
1927			120	217	168	93		598	400	
1928			221	217	252	32		722	400	
C. O. KISTER[2] MILE 52.5L. PUMP, 1-6"										
1924										
1925			16.1	24.8	13.6			54.5	72	
1926			28	21				49	60	
1927			20	32	8			60	46	
1928		13	22	20	10	13		78	46	

[1] Garden Highway Orchard Company prior to 1927.
[2] H. W. Sealey, 1925; Gridley Bank of Italy, 1926.
NOTE—For detail explanatory notes relative to diversions and acreage see Tables 80 to 84, inclusive.

TABLE 109—Continued

FEATHER RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
L. A. KISTER MILE 55.5L. PUMP, 1-8″										
1924										
1925										
1926			39	51	11			101	130	
1927			16	69	29			114	55	
1928			53	47				100	48	
S. A. McKEEHAN MILE 5.44L. PUMP, 1-6″										
1924						93		93	40	
1925					104	49	5	158	60	
1926					24			24	20	
1927	No diversion									
1928			5	7	6	4	1	23	10	
MEYER AND RUTZ[1] MILE 1.55L. PUMP, 1-6″										
1924						97		97	40	
1925		28	37	51	32	24	28	200	70	
1926		18	59	59	43	15	8	202	165	
1927		7	12	66	22	16	6	129	90	
1928		12	57	32	31	32	4	168	74	
F. L. MORRIS MILE 52.7L. PUMP, 1-8″										
1924										
1925			38	32	15	6	19	110	40	
1926			29	18	15	3		65	40	
1927		16	19	18	9		1	63	60	
1928		10	26	32	6		2	76	75	

MOZNETT-WETMORE SUBDIVISION NO. 1 (CHARLES ST. CLAIRE) MILE 43.7L. H. SI. 1.2L[1] PUMP, 1-10″										
1924										
1925		14	152	152	55	57		430	240	
1926		14	226	173	160	67		640	203	
1927		52	98	123	136	39		448	188	
1928		100	147	154	91	32	4	528	181	
PACIFIC HIGHWAY ORCHARDS TRACT (CHARLES COTTRELL) MILE 43.7L; H.SL. 0.4L[2] PUMP, 1-18″										
1924										
1925			40	27		24		91	65	
1926			46	68	49	36		199	65	
1927		54	124	171	81	41		471	115	
1928			74	43	19	8		144	60	
PLUMAS MUTUAL WATER COMPANY[3] MILE 16.0L. PUMP, 1-22″[4]										
1924		743	736	331	1,030	105		2,945	800	
1925		475	1,451	1,368	1,448	818	285	5,845	920	500
1926	168	1,294	1,315	1,365	1,083	684		5,909	1,012	500
1927		34	1,499	1,869	1,675	780	159	6,016	1,156	250
1928			1,516	2,198	2,275			5,989	917	300
GEORGE POLLOCK CO.[5] MILE 9.75R PUMPS, 1-12″, 1-16″										
1924		127	332	242	15	115	268	1,099	60	
1925			59	228	111	44		442	342	
1926		449	212	328	262			1,251	606	
1927		93	432	435	135	71	129	1,295	828	
1928		45	393	470	155	112	83	1,258	933	

[1] Robert E. Shields prior to 1927.
[2] Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7L.
[3] Farm Land Investment Company prior to 1928.
[4] 20-inch prior to 1926.
[5] Listed as F. Parker, 1924.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 80 to 84, inclusive.

TABLE 109—Continued

FEATHER RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
RIO BONITO RANCH MILE 56.6R. PUMP, 1-14"										
1924										
1925										
1926				148	57			205	45	
1927				155	27			182	50	
1928			133	67	64	30		294	85	
M. SCHEIBER MILE 7.7L. PUMP, 1-8"										
1924		39	69	58	72	34		272	120	
1925			13	54	35	18	5	125	120	
1926				45	16	44	5	110	45	
1927	No diversion									
1928			2	92	92	74		260	60	
G. C. SHANNON MILE 18.75R. PUMP, 1-6"										
1924										
1925										
1926			45	39	10			94	60	
1927				92	17			109	66	
1928			60	51	39			150	80	
SILVA-BERGTHOLDT CO. MILE 51.6R. PUMP, 1-5"										
1924										
1925		9	15	17	7			48	30	
1926		3	7	7	3			20	30	
1927				7	6	1		14	45	
1928			9		7			16	25	

DONALD STEADMAN[1] MILE 51.4R. PUMP, 1-10″										
1924										
1925										
1926										
1927										
1928					51	56			107	40
J. L. SULLIVAN MILE 33.9R. PUMP, 1-10″										
1924										
1925				26	63	47			136	80
1926				89	44	20	35	7	195	80
1927			44	54	136	91			325	155
1928			70	193	192	68			523	150
SUTTER BASIN COMPANY MILE 2.60R PUMPS, 1-20″, 1-26″										
1924										
1925					1,463	1,620	425		3,508	1,262
1926				532	240	753	90		1,615	745
1927					770	1,667	28		2,465	972
1928				10	595	979			1,584	608
SUTTER-BUTTE CANAL COMPANY (SUNSET PLANT) MILE 38.1R PUMPS, 1-26″, 2-42″										
1924		4,870	6,847	4,525	4,725	815			21,782	1,440	2,730
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	No diversion									
SUTTER-BUTTE CANAL COMPANY MILE 58.1R. GRAVITY										
1924	34,320	54,623	35,603	37,276	41,705	33,892	12,712		250,131	16,919	12,270
1925	8,750	58,650	65,970	65,476	58,830	51,652	7,980		317,308	19,097	16,696
1926	14,040	63,820	74,574	73,406	71,514	39,120	3,600		340,074	15,871	22,159
1927	14,755	80,928	82,231	82,987	74,378	56,698	17,678		409,655	16,128	24,896
1928	19,013	84,717	83,619	76,239	70,572	39,664	11,900		385,724	16,035	22,008

[1] New installation, 1928.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 80 to 84, inclusive.

TABLE 109—Continued

FEATHER RIVER DIVERSIONS, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
WESTERN CANAL COMPANY MILE 59.7R. GRAVITY										
1924	1,694	12,830	14,807	14,006	17,812	4,772	----	65,921	813	7,091
1925	756	11,397	18,735	17,784	15,977	8,809	489	73,947	144	9,153
1926	2,320	16,686	23,787	25,434	24,788	13,309	280	106,604	116	11,635
1927	2,566	12,258	19,882	22,894	20,832	12,106	556	91,094	678	12,022
1928	669	14,410	19,121	19,617	19,189	5,904	40	78,950	543	9,821

Year	Monthly diversions in acre-feet					Total diversions September to January	Acreage irrigated	
	September	October	November	December	January		General	Rice
WESTERN CANAL COMPANY MILE 59.7R. GRAVITY								
1924	5,792	7,510	----	2,926	----	16,228		
1925	----	2,457	7,916	8,084	2,766	21,253	Diversions for duck clubs	Butte Basin
1926	----	8,000	5,436	----	----	13,436		
1927	----	5,218	334	2,574	----	8,126		
1928	1,279	7,343	6,653	6,958	----	22,233		

TABLE 110

YUBA RIVER DIVERSIONS, 1925* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
DANTONI ORCHARDS[1] MILE 4.2L. PUMP 1-10″**										
1925			214	48	276	165		703	300	
1926		1	185	125	153	38		502	210	
1927				6	67			73	90	
1928	No diversion									
DANTONI ORCHARDS[2] MILE 5.2L. PUMP, 1-8″										
1925		70	112	91				273	80	
1926				45				45	90	
1927				29	43			72	100	
1928			48	11	38			97	60	
WM. W. DINSMORE MILE 4.5L. PUMP, 1-6″										
1925										
1926										
1927		7	9	7	7			30	56	
1928		10	2	2				14	35	
HALLWOOD IRRIGATION COMPANY AND CORDUA IRRIGATION DISTRICT[3] MILE 11.0R. GRAVITY										
1925										
1926		4,650	6,275	8,271	10,350	4,387	120	34,053	2,502	3,279
1927	200	6,350	9,690	9,390	8,250	4,170	432	38,482	3,442	1,930
1928		7,319	8,709	9,399	8,613	2,245		36,285	4,440	1,875

*Yuba River diversions were not listed prior to 1925.

**Approximate mileage along river above highway crossing at Marysville.

[1] Howard Reed Orchard Company, 1925 and 1926.

[2] Marysville River Farms Company, 1925 and first part of 1926; Howard Reed Orchard Company, latter part of 1926.

[3] Hallwood Irrigation Company and Cordua Irrigation District have a common point of diversion and common canal for a short distance. Diversion and acreage figures are for combined projects. Not listed until 1926, although operated prior thereto.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 85 to 88, inclusive.

TABLE 110—Continued

YUBA RIVER DIVERSIONS, 1925* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions, April to October	Acreage irrigated	
	April	May	June	July	August	September	October		General	Rice
MARYSVILLE RIVER FARMS COMPANY (PLANT No. 4) MILE 7.5L. PUMP, 1-10"[1]										
1925		145	272		35			452	260	
1926	No diversion									
1927	No diversion									
1928	Plant removed									
MARYSVILLE RIVER FARMS COMPANY (PLANT No. 1) MILE 6.6L. PUMP, 1-12"[2]										
1925		270	643	564	271	84	14	1,846	886	
1926			202	271	261	166		900	207	
1927	104	135		282	273	27		821	127	
1928				239	165			404	400	
MARYSVILLE RIVER FARMS COMPANY (PLANT No. 3)[3] MILE 2.8L. PUMP, 1-12"										
1925		132	353	282	4			771	270	
1926		30	163	181	21	13		408	225	
1927			62	94	93	23		272	188	
1928	No diversion									

*Yuba River diversions were not listed prior to 1925.
[1] In 1925 there was also a 7 inch pump at this location, called Plant No. 5
[2] Diverts to irrigation unit No. 8—In 1925 there was also a 10 inch pump at this location, called No. 1 Auxiliary.
[3] Diverts to irrigation unit No. 10.
NOTE—For detail explanatory notes relative to diversions and acreage see Tables 85 to 88, inclusive.

TABLE 111

AMERICAN RIVER DIVERSIONS, 1924* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated[1]
	April	May	June	July	August	September	October		
H. W. BARTELL									
****MILE 10.3L. PUMP, 1-20″**									
1924									
1925		69	205	182	48			504	106
1926		238		230				468	100
1927		93	118		130			341	75
1928			224					224	200
CARMICHAEL IRRIGATION DISTRICT									
MILE 16.0R. PUMPS, [2]1-12″, 1-8″, 1-6″									
1924									
1925	13	6	321	310	627	249	51	1,577	1,777
1926		95	563	619	585	240	115	2,217	1,763
1927	14	162	643	918	829	367	364	3,297	1,807
1928	121	563	820	791	750	639	416	4,100	1,837
A. F. COUNSMAN (NELSON)									
MILE 9.2L. PUMP, 1-8″									
1924									
1925				31	60	10		101	133
1926			41	17	15			73	86
1927			17	36	8			61	86
1928				28	2			30	40
HENRY COWELL									
MILE 9.9L. PUMP, 1-5″									
1924									
1925			8	7	11			26	45
1926			16	62	8			86	50
1927				59				59	50
1928			15	32				47	40

*In 1924 only those diversions below the H st. bridge, Sacramento, were listed. Many diversions listed initially in 1925 probably operated in 1924.
**Mileage along river above its mouth.
[1] All general crops. No rice.
[2] 12 inch pump was added in 1927.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 89 to 92, inclusive.

TABLE 111—Continued

AMERICAN RIVER DIVERSIONS, 1924* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
S. H. COWELL MILE 7.1L. PUMP, 1-7″									
1924									
1925			13	15	21	3	13	65	30
1926		20	53	57	23	24	6	183	50
1927		16		81	137	22		256	70
1928			27	76	35	92		230	75
CUTTER BROTHERS MILE 6.8L. PUMP, 1-5″									
1924									
1925		5	23	11	15	8	8	70	30
1926		4	6		9	6	2	27	30
1927			17	7	7	15		46	30
1928		3	12		4	4		23	87
DEL PASO HOP COMPANY MILE 10.5R. PUMP, 1-10″									
1924									
1925				36	25	40	23	124	60
1926			70	42	42	32	5	191	80
1927				34	24	23	15	96	40
1928	No diversion								
MARY DETERDING MILE 13.9R. PUMP, 1-6″ [1]									
1924									
1925			16	60	13	20	13	122	90
1926		18	20	22	21	17	3	101	[2]171
1927		0.1	24.0	8.5	4.1	2.3	2.0	41.0	[2]252
1928			4.6	2.1				0.7	27

MARY DETERDING									
MILE 15.1R. PUMP, 1-4″									
1924									
1925									
1926					7	4	7	1	19	(3)
1927			2.2	1.6	13.4	7.7	13.5	6.3	44.7	(3)
1928	No diversion									
WM. H. DEVLIN									
MILE 17.1R. PUMPS, 1-6″ AND 1-1¼″									
1924									
1925		0.1	1.7	4.9	2.3	1.0		10.0	18
1926		2	8	1	7			18	23
1927		1.4	3.7	7.3	6.3	1.1	1.1	20.9	23
1928		1.8	2.1	2.2	0.4	2.1	2.2	10.8	42
E. H. GERBER									
(GOLD NUGGET ORCHARD COMPANY)									
MILE 10.4R. PUMP, 1-5″									
1924									
1925									
1926									
1927			5	39	13	3		60	60
1928	Plant removed								
GIBBENS AND RICHARDSON									
MILE 10.2R. PUMP, 1-8″									
1924									
1925		11			15			26	72
1926			18	16				34	72
1927			4	39				43	72
1928			6	26	2			34	76
GLACKEN, DWYER AND STEVENS									
(PIONEER FRUIT COMPANY)									
MILE 8.1L. PUMP, 1-8″									
1924									
1925			99	2				101	35
1926	No diversion								
1927	Abandoned								
1928									

*In 1924 only those diversions below the H St. bridge, Sacramento, were listed. Many diversions listed initially in 1925 probably operated in 1924.

[1] 3 inch and 4 inch pumps prior to 1926.

[2] Total acreage irrigated by both Deterding plants, Mile 13.9R and Mile 15.1R.

[3] See Deterding Plant at Mile 13.9R.

[4] Gardens and domestic.

NOTE—For detail explanatory notes relative to diversions and acreage see Tables 89 to 92, inclusive.

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TABLE 111—Continued

AMERICAN RIVER DIVERSIONS, 1924* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
J. T. GORE ESTATE (C. E. WELLS) MILE 11.5L. PUMP, 1-6″									
1924									
1925									
1926				8				8	46
1927	No diversion								
1928	No diversion								
	No diversion								
HAGGIN BOTTOM LAND COMPANY[1] MILE 12.6R. PUMP, 1-10″									
1924									
1925									
1926		95	90					185	288
1927	No diversion								
1928	No diversion								
	Plant removed								
M. T. HARDING[2] MILE 9.0L. PUMP, 1-7″[3]									
1921									
1925									
1926				12				12	34
1927			6	12		1		19	42
1928		9	13	11	6			39	42
			26	11				37	45
ANNIE HOEY MILE 11.2L. PUMP, 1-8″									
1924									
1925									
1926				6	10			16	5
1927	No diversion								
1928			72	2	12			86	60
	No diversion								

E. CLEMENS HORST COMPANY MILE 6.0R. PUMP, 1-8″									
1924									
1925			43	149	72	33	18	315	60
1926			43	55	14	20	8	140	98
1927				71	15		18	104	80
1928			54	47	16			117	78
E. CLEMENS HORST COMPANY MILE 7.5R. PUMP, 1-8″									
1924									
1925			28	85	42			155	96
1926			43	66				109	95
1927				100	54			154	124
1928				72	11			83	100
MARDSEN MILE 5.6L. PUMP, 1-3″									
1924	6	5	5	5	5	5	5	36	20
1925	4	5	4	4	4	4	4	29	10
1926	Plant removed								
1927									
1928									
MARDSEN MILE 5.7L. PUMP, 1-6″									
1924	15	15	14	13	14	15	6	92	20
1925	Plant removed								
1926									
1927									
1928									
G. A. MEISTER MILE 3.2L. PUMP, 1-10″									
1924	19	22						41	[4]200
1925	49	23	18	34	23	5	4	156	[4]240
1926	5	8	27	15	30	17		102	[4]240
1927		10	16	20	22	8		76	[4]240
1928		5	65	69	64	60	28	291	[4]238

*In 1924 only those diversions below the H St. bridge, Sacramento, were listed. Many diversions listed initially in 1925 probably operated in 1924.
[1] Listed as Spreckels Sugar Company in 1925.
[2] Harding Brothers, 1925.
[3] 5 inch pump in 1925—replaced by 7 inch in 1926 at new location 500 feet upstream.
[4] Combined acreage for this plant and Meister plant at mile 3.8L.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 89 to 92, inclusive.

TABLE 111—Continued

AMERICAN RIVER DIVERSIONS, 1924* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
G. A. MEISTER MILE 3.6L. PUMP, 1-4″									
1924									
1925									
1926	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
1927	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
1928	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1	Industrial
G. A. MEISTER MILE 3.8L. PUMP, 1-10″									
1924	52	58	125	145	121	80		581	(1)
1925			32	86	39	29		186	(1)
1926		3	48	67	53	24	16	211	(1)
1927	2	19	26	48	34			129	(1)
1928			21	32	19	8	2	82	(1)
WM. A. MEYER MILE 11.7L. PUMP, 1-4″									
1924									
1925		4	12	13			5	34	25
1926		2	16	8	1	6		33	31
1927			16	15	18			49	31
1928		7	11	9	3		3	33	29
EDWARD MORININI MILE 8.7R. PUMP, 1-8″									
1924									
1925				11	68			79	60
1926			37	62	30	30		159	40
1927			2	70	116	45		233	40
1928				7	24	13	6	50	65

HARRY NAKATOMI[2] MILE 11.7L.[3] PUMP, 1-5″									
1924									
1925	No diversion								
1926	No diversion								
1927	No diversion								
1928			11	32				43	20
KIYOSHI OKOMOTO[4] MILE 7.9R. PUMP, 1-8″									
1924									
1925				119	80	56	3	258	120
1926		44	104	52	56			256	77
1927		3	109	108	16			236	77
1928			12	8	14			34	14
P. OSTERLE[5] MILE 13.2R. PUMP, 1-4″									
1924									
1925									
1926									
1927					16			16	49
1928					19			19	20
P. M. ROONEY MILE 8.6L. PUMP, 1-8″									
1924									
1925	No diversion								
1926			51					51	38
1927		2	39					41	38
1928			68					68	38
C. SWANSTON AND SON MILE 5.2R. PUMP, 1-4″[6]									
1924									
1925		43	70					113	150
1926	No diversion								
1927		2	3	7	8	13	3	36	10
1928	Plant removed								

*In 1924 only those diversions below the 11 St. bridge, Sacramento, were listed. Many diversions listed initially in 1925 probably operated in 1924.

[1] See Meister plant at Mile 3.2L.

[2] Annie Hoey (Land Ranch) prior to 1928.

[3] Pump moved from 11.8L to 11.7L in 1928.

[4] Edward Morinini prior to 1928.

[5] Not listed prior to 1927 but owner states plant was operated previously.

[6] 10-inch pump used in 1925; dismantled in 1926; 4-inch pump installed 1927.

NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 89 to 92, inclusive.

TABLE 111—Continued

AMERICAN RIVER DIVERSIONS, 1924* TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
C. E. WELLS MILE 9.45L. PUMP, 1-5″									
1924									
1925				20				20	[1]50
1926			12	20				32	[1]50
1927			1	16				17	[1]50
1928			11	6	7			24	[1]40
C. E. WELLS MILE 9.5L. PUMP, 1-8″									
1924									
1925				30	20			50	([2])
1926			39	36				75	([2])
1927			3	43				46	([2])
1928			28	8				36	([2])

*In 1924 only, those liversions below the H St. bridge, Sacramento, were listed. Many liversions listed initially in 1295 probably operated in 1924.
[1] Combined acreage irrigated from both Wells plants, Mile 9.45L and Mile 9.5L.
[2] See plant at Mile 9.45L.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 89 to 92, inclusive.

TABLE 112

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
BYRON-BETHANY IRRIGATION DISTRICT									
***MILE 40.9L. PUMPS, 1-26,'' 1-30''**									
1924	1,459	3,860	3,740	4,270	3,050	2,250	429	19,049	7,500
1925		1,050	3,627	4,094	3,441	1,857	118	14,187	9,000
1926	1,368	4,029	4,685	4,406	3,180	2,665	243	20,576	8,976
1927		4,492	3,235	3,850	3,014	1,989	157	16,737	9,000
1928	335	4,177	3,426	3,376	3,556	1,640	264	16,774	10,500
J. F. COSTA[1]									
MILE 45.2L. PUMP, 1-8''									
1924									
1925									
1926									
1927									
1928		15	20	4	11	6	7	63	50
EAST CONTRA COSTA IRRIGATION DISTRICT[2]									
MILE 36.5L. PUMPS, 2-30,'' 1-24,'' 1-18''									
1924	4,070	3,640	3,680	2,910	2,930	1,570	421	19,221	10,256
1925	127	1,174	3,642	4,962	3,965	2,247	432	16,549	12,000
1926	493	4,233	5,422	5,223	5,039	3,823	706	24,939	14,800
1927	343	4,972	5,424	4,628	4,477	3,015	1,507	24,360	14,000
1928	1,519	6,827	6,350	5,830	5,003	3,128	1,291	29,948	15,160

*Mileage is from mouth of San Joaquin River 4½ miles below Antioch.

[1] Reported for first time in 1928. Has probably operated in previous years.

[2] Prior to 1926, East Contra Costa Irrigation Company serving water to Brentwood, Knightsen and Lone Tree Irrigation Districts. These districts were consolidated into East Contra Costa Irrigation District in 1926.

NOTE—For detail explanatory notes relative to diversions and acreage see Tables 93 to 97, inclusive.

TABLE 112—Continued

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
FREEMONT IRRIGATION ASSOCIATION[1] MILE 50.9L. PUMP, 1-14''									
1924									
1925									
1926									
1927									
1928		74	374	313	353	137	19	1,270	900
LABRUCHERIE, PLATTI AND SMALLPAGE[1] MILE 52.4L. PUMP, 1-10''									
1924									
1925									
1926									
1927									
1928				86	35	36		157	118
H. LINDEMAN[2] MILE 47.2L. PUMP, 1-12''									
1924									
1925									
1926									
1927									
1928	82	172	122	144	122	107	92	841	300
NAGLEE-BURK IRRIGATION DISTRICT MILE 50.4L. PUMPS, 1-16,'' 1-18''									
1924	961	900	974	1,100	935	637	883	6,390	2,600
1925		654	1,313	1,321	908	1,053		5,249	2,600
1926	108	1,234	1,101	942	996	866	122	5,369	2,600
1927		1,148	985	723	1,009	890	97	4,852	1,856
1928	172	1,234	1,202	1,173	1,148	1,031	82	6,042	[3]2,057

E. H. STEVENSON[2] (RAY BROS.) MILE 45.8L. PUMP, 1-12″									
1924									
1925									
1926									
1927									
1928	24		55	27	52	18	7	183	70
N. E. AND JOHN WELTY[4] (T. B. SILVA) MILE 48.7L. PUMP, 1-8″									
1924									
1925									
1926									
1927	6	17	11	6		26		66	79
1928		26	24	29	29	9		117	70
WEST SIDE IRRIGATION DISTRICT MILE 47.65L. PUMPS, 7-15″									
1924	3,830	4,200	4,040	4,180	3,930	3,820	1,900	25,900	8,834
1925	1,610	4,452	4,651	5,887	5,640	4,247	1,797	28,292	11,077
1926	2,471	6,030	6,212	6,119	6,068	5,022	1,080	33,002	11,104
1927	1,466	5,683	5,102	5,045	4,151	3,478	743	25,668	10,416
1928	1,298	4,370	3,464	3,544	3,392	3,073	917	20,058	10,699

[1] New installation, 1928.
[2] Reported for first time in 1928. Has probably operated in previous years.
[3] Includes 107 acres of rice.
[4] Not listed prior to 1927 but owner states plant was operated in 1926 and prior to 1924.
NOTE—For detail explanatory notes relative to diversions and acreage see Tables 93 to 97, inclusive.

TABLE 113

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
CALIFORNIA IRRIGATED FARMS COMPANY PLANT NO. 1 *MILE 2.9S. PUMP, 1-12''									
1924									
1925			152	49	230	31		462	[1]2,600
1926	111	127	102	170	126	100		736	[1]2,194
1927		147	126	160	148	124	14	719	[1]2,385
1928		161	101	101	68	70	31	532	[1]2,491
CALIFORNIA IRRIGATED FARMS COMPANY PLANT No. 3. MILE 6.3S. PUMP, 1-18''									
1924	551	838	740	664	657	432	401	4,283	910
1925		560	1,053	952	824	701	182	4,272	[2]
1926	499	1,102	1,122	894	853	947		5,417	[2]
1927	24	1,305	1,092	1,253	1,336	1,148	463	6,621	[2]
1928	495	1,150	1,024	1,287	1,112	881	883	6,832	[2]
CALIFORNIA IRRIGATED FARMS COMPANY PLANT NO. 5. MILE 8.3S. PUMP, 1-12''									
1924									
1925		220	234	359	316	242	41	1,412	[2]
1926	99	193	176	237	181	145		1,031	[2]
1927		363	191	186	219	256	56	1,271	[2]
1928	115	294	238	226	216	174	38	1,301	[2]
CALIFORNIA IRRIGATED FARMS COMPANY PLANT No. 5A. MILE 9.0S. PUMP, 1-12''									
1924									
1925									
1926	69	209	118	284	161	105	22	968	[2]
1927		52	104	222	160	127	153	818	[2]
1928	152	130	195	166	87	159		889	[2]

CALIFORNIA IRRIGATED FARMS COMPANY PLANT NO. 6A. MILE 9.2N.[2] PUMP, 1-12″									
1924									
1925		51	142	172	165	106		636	(2)
1926	118	416	96	174	229	116		1,149	(2)
1927	29	219	46	32	45			371	(2)
1928	Plant removed								
HOLLY WESTERN SUGAR COMPANY[4] MILE 2.1S. PUMP, 1-12″									
1294					400	400	400	1,200	
1925					353	540	554	1,447	Industrial
1926						466	558	1,024	Industrial
1927					50	390	403	843	Industrial
1928					224	420	434	1,078	Industrial
STINSON ESTATE COMPANY[5] MILE 0.7S. PUMP 1-20″									
1924	1,150	1,470	1,740	1,360	1,210	446	353	7,729	1,500
1925		680	1,610	1,168	883	436		4,777	3,700
1926		1,262	1,178	1,189	946	604		5,179	2,160
1927	26	1,145	943	994	964	513	343	4,928	3,141
1928		181	651	431	374	536	35	2,208	1,715
TRACY-CLOVER IRRIGATION DISTRICT MILE 2.1S. PUMP, 1-16″									
1924	225	221	216	214	152	196	88	1,312	400
1925		161	300	327	286	149	157	1,380	1,081
1926	30	367	303	290	407	24	113	1,534	619
1927	15	469	402	252	244	72	223	1,684	631
1928	23	195	380	245	272	257	228	1,600	700

*Mileage along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River.
[1] This is the total uplands area (south of Tom Paine Slough) irrigated from all California Irrigated Farms Company plants listed for this year.
[2] See company plant at Mile 2.9 South.
[3] This plant diverts water to lands both north and south of Tom Paine Slough. The diversions given are those to the south (uplands) only.
[4] Alameda Sugar Company prior to 1927.
[5] Valley Land and Sugar Company prior to 1928.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 98 to 102, inclusive.

TABLE 114

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
G. ACCINIELLI									
***MILE 48.7R. PUMP, 1-6″**									
1924	20	32	15	15	24	22	6	134	60
1925		6	12	12	11	9	2	52	62
1926	5	10	30	22	33	20	4	124	82
1927	14	33	25	13	43	23	10	161	60
1928	12	29	25	22	49	35	17	189	47
BANTA CARBONA IRRIGATION DISTRICT									
MILE 67.5L. PUMPS, 1-36″, 3-24″, 2-20″									
1924	382	530	502	575	504	390	73	2,956	2,100
1925			213	670	920	517	6	2,326	2,000
1926	5,586	8,211	6,773	7,366	6,918	5,456	1,531	41,841	9,585
1927	634	7,906	7,488	8,227	8,685	3,731	629	37,300	12,024
1928	2,942	7,331	6,739	8,374	7,473	4,145	1,754	38,758	15,734
JOHN BRANDT									
MILE 50.5R. PUMP, 1-6″									
1924	7	8	10	25	10	5	3	68	20
1925		2.7	4.4	0.4	2.1	2.4		12.0	3
1926		8	3	5	2			18	3
1927			3.0	3.7	3.9	2.6	1.1	14.3	3
1928		6.2	5.0	2.5				13.7	3
JOE CALCAGNO									
MILE 48.5R. PUMP, 1-6″									
1924									
1925									
1926									
1927			20	5	21			46	30
1928			41	8	24	27	25	125	68

P. COLORI COMPANY									
MILE 57.5R. PUMP, 1-4″									
1924		3	12	17	10	5		[2]47	50
1925	1	2	12	10	4	4	2	[2]35	20
1926		4	9	14	9	5	1	[2]42	22
1927	2	15	13	16	15	3	1	[2]65	22
1928	10	10	17	11	10	3		61	30
M. O. COUPER (M. MATSUMOTO)[3]									
MILE 49.0R. PUMP, 1-5″									
1924									
1925									
1926	17	17	8	4	3			49	22
1927		4	15	11	21	7		58	25
1928		1.9	2.6	3.8	1.0	0.5		9.8	2
F. DELIMA									
MILE 53.4R. PUMP, 1-8″									
1924	30	30	30	30	30	30	30	210	40
1925		13	27	27	21	18	7	113	30
1926	5	24	18	14	14	13		88	30
1927		18	18	18	9	8		71	30
1928		8	11	19	5	7		50	33
EDWARD DENTON									
MILE 47.5R. PUMP, 1-4″									
1924		4	4	4	4			16	7
1925	No diversion								
1926	Plant removed								
1927									
1928									
M. DOS REIS (CORDOZA, SOUSA AND AVELLAR)									
MILE 53.7R. PUMP, 1-10″									
1924	132	176	220	198	164	164	45	1,099	300
1925		96	180	191	155	151		773	300
1926	36	98	141	107	148	86	39	655	320
1927		263	169	198	202	76	32	940	400
1928	46	125	195	187	172	129		854	400

*Milcage along San Joaquin River from its mouth 4½ miles below Antioch.
[1] 36 inch pump added in 1928.
[2] Diversions corrected as per note, Table 107.
[3] J. Erlinger, 1926.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 103 to 107, inclusive.

TABLE 114—Continued

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
AUGUST EISELE MILE 47.2R. PUMP, 1-5″									
1924	5	5	5	5	5	5		30	8
1925		1.4	6.4	2.8	2.1			12.7	8
1926		2	6	3	3			14	8
1927		7.1	6.8	2.5	1.2			17.6	10
1928	2.0	2.9	3.3	3.3	2.5			14	9
B. B. FIGARI (G. ALFIERI) MILE 58.6R. PUMP, 1-3″									
1924		3	6	7	8	2		26	10
1925			1.2	0.6	0.8	0.2		2.8	2
1926		0.9	1.6	1.8	1.6	0.8	0.3	7	2
1927	0.6	0.8	1.3	1.2	1.3	0.3	0.4	5.9	2
1928	0.8	0.9	1.4	1.6	1.6	0.3	0.2	6.8	3
W. C. FRANK (M. MARTIN CO.) MILE 54.9R. PUMP 1-10″									
1924			12	28	23	23		86	60
1925		20	36	18	32	13		119	40
1926	6	31	13	24	25	26		125	40
1927			42	36	32			110	40
1928		19	27	15	31	15	4	111	45
JOHN HAACK MILE 47.7R. PUMP, 1-4″									
1924									
1925									
1926									
1927	2.6	0.2	1.2	0.5	1.4			5.9	[1]255
1928			2.8					2.8	[1]105

JOHN HAACK										
MILE 48.0R. PUMP, 1-12″										
1924	----------	121	40	70	48	255	----------	534	400	
1925	----------	----------	24	26	5	----------	----------	55	100	
1926	----------	9	57	29	11	310	----------	416	350	
1927	----------	----------	39	----------	----------	166	28	233	(2)	
1928	----------	----------	31	44	----------	----------	----------	75	(2)	
JOHN KILCANNON[3]										
MILE 63.8R. PUMP, 1-12″										
1924	----------	350	350	350	350	----------	----------	1,400	465	
1925	No diversion									
1926	No diversion									
1927	No diversion									
1928	Plant removed									
N. LAGLER AND JOE REICHMUTH[4]										
MILE 50.4R. PUMP, 1-8″										
1924	124	43	99	109	88	67	24	554	100	
1925	----------	53	62	49	35	11	----------	210	76	
1926	----------	44	29	43	40	26	----------	182	76	
1927	9	42	42	43	38	35	7	216	65	
1928	----------	42	44	36	38	23	6	189	73	
R. MAURO										
MILE 58.7R. PUMP, 1-3″										
1924	----------	2	3	7	4	----------	----------	16	10	
1925	----------	0.1	0.8	0.8	0.6	0.3	0.1	2.7	3	
1926	0.7	0.9	1.9	3.8	1.8	0.2	0.1	9.4	3	
1927	1.8	0.8	2.9	1.3	1.6	0.9	0.4	9.7	2	
1928	1.0	2.1	2.0	1.3	1.7	1.2	----------	9.3	4	
H. A. NIESTRATH (JOSEPH EGGER)										
MILE 59.3R. PUMP, 1-14″										
1924	75	74	157	206	97	96	----------	705	120	
1925	----------	63	128	----------	176	107	----------	474	125	
1926	----------	106	256	205	190	174	----------	931	125	
1927	----------	57	54	66	58	117	----------	352	100	
1928	10	29	61	78	50	56	----------	284	85	

[2] Combined acreage irrigated from both Haack plants, Mile 47.7R and Mile 48.0R.
[3] See Haack Plant at Mile 47.7R.
[4] Paul T. Williamson prior to 1927.
[5] Listed under F. Reichmuth prior to 1926.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 103 to 107, inclusive.

TABLE 114—Continued

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER, 1924 TO 1928, ALPHABETICALLY ARRANGED

Year	Monthly diversions in acre-feet							Total diversions April to October	Acreage irrigated
	April	May	June	July	August	September	October		
OAKWOOD STOCK FARM									
MILE 57.0R. PUMP, 1-14″									
1924	220	227	272	387	308	215		1,629	300
1925			268	292	181	107	19	867	214
1926		139	116	189	132	122		698	214
1927	41	99	133	120	130	78	27	628	304
1928	45	134	168	165	137	106	35	790	353
FRANK PICCARDO									
MILE 48.6R. PUMP, 1-6″									
1924	27	41	37	25	27	13	6	176	80
1925	4	6	10	18	27	7	3	75	40
1926		8	34	32	25	11	1	111	60
1927	8	12	25	15	11	4	1	76	60
1928	3	14	4	9	8	4	1	43	40
RIVER JUNCTION FARMS COMPANY[1]									
MILE 73.2R. PUMP, 1-12″									
1924									
1925									
1926									
1927			5	22	17	15	9	68	100
1928				56	45	30	7	138	200
A. A. RODGERS[2]									
MILE 50.1R. PUMP, 1-8″									
1924	15	15	15	15	15	15		90	15
1925				36	20			56	30
1926		22	30	31	28			111	80
1927		22	18	15	16	12		83	80
1928		37	39	21	32	3		132	90

V. SANGUENETTI									
MILE 58.4R. PUMP, 1-2½″									
1924		4	7	7	6	2		26	10
1925	0.3	1.2	4.6	3.0	2.5	0.8	0.4	12.8	5
1926	1.2	0.7	1.2	3.3	2.3	0.2	0.3	9.2	5
1927	1.2	0.9	1.2	2.5	2.3	0.5	0.6	9.2	2
1928	3.3	1.3	2.6	3.6	3.1	0.4	0.2	14.5	5
A. J. THOMPSON									
MILE 57.3R. PUMP, 1-5″									
1924									
1925									
1926			0.8					0.8	3
1927					0.6	0.1		0.7	2
1928		5.6						5.6	5
PAUL WESTON									
MILE 46.3R. PUMPS, 1-4,″ 1-6″									
1924	54	56	54	56	56	54	19	349	120
1925		10	112	135	63	54		374	110
1926		27	135	127	76	34		399	110
1927		28	84	70	51	14		247	120
1928		77	75	47	42	19		260	130
WOLFINGER BROTHERS									
MILE 47.3R. PUMP, 1-10″									
1924	35	35	35	35	35	20		195	60
1925			43	35	35	34		147	56
1926		38	34	30	32	25		159	56
1927		30	25	50	25	25		155	55
1928		39	26	33	33			131	55

[1] New installation 1927.
[2] Listed under Wm. Rodgers, 1924 and J. Rodgers, 1925.
NOTE.—For detail explanatory notes relative to diversions and acreage see Tables 103 to 107, inclusive.

CHAPTER IV

MEASUREMENTS OF RETURN WATER

The development of the water resources in California has reached a stage where the recovery of waste, seepage and return water has become an important consideration. For this reason, one of the phases of the Sacramento-San Joaquin investigation of first importance has been that which would furnish records of the extent of return waters.

As a result both of the cycle of dry years through which the interior valleys have been passing and the greatly increased irrigation development, the summer flow of both the Sacramento and San Joaquin rivers in the lower stretches has consisted almost entirely in recent years, of water returned to the stream from upper irrigation operations. Development along these lower stretches and in the delta region has therefore become more and more dependent upon this return water and a necessity has been created for measurements and records of its quantity and extent.

Investigations of return water in the San Joaquin Valley were begun by the Division of Water Rights in 1920 and reports of this work up to 1924 have been published in the biennial reports of the division and in Bulletin No. 1. Beginning with the 1924 season the return water investigations have been conducted through the office of the Water Supervisor and also, beginning in that year, the work has included the Sacramento Valley return flow.

San Joaquin Return Waters.

Normally, by July or earlier, all of the waters of the Stanislaus, Tuolumne and Merced rivers are diverted at the foothills and likewise the waters of the San Joaquin River are entirely diverted in the vicinity of Mendota and Dos Palos. During the greater portion of the irrigation season practically all of the water in these streams below the points of diversion is, therefore, return water.

In the seasons 1924 to 1927, inclusive, the method of return water measurements has been to take three series of measurements along each stream beginning near the foothills and working downstream to the mouth, noting all pumping diversions between each point of measurement. The first series was usually taken in July, the second in late August and the third late in September or early October. In addition to the four streams that have been named, measurements have been taken each year along Dry Creek, tributary to the Tuolumne River at Modesto. This stream was included as being particularly representative of return water conditions in the Modesto Irrigation District and other San Joaquin districts similarly situated.

For the years 1924 to 1927, tables 119 to 122, inclusive, list the measured return flow at the lowest station on each stream for each series, and tables 124 to 127, 129 to 132, 134 to 137, 139, and 141 to 144 (all numbers inclusive), present in detail the measurements along each stream.

Beginning in 1926, some difficulty in making the measurements was encountered at times due to the fact that water used for power (in excess of canal requirements) was intermittently released from the irrigation district storage reservoirs. This was particularly the case on

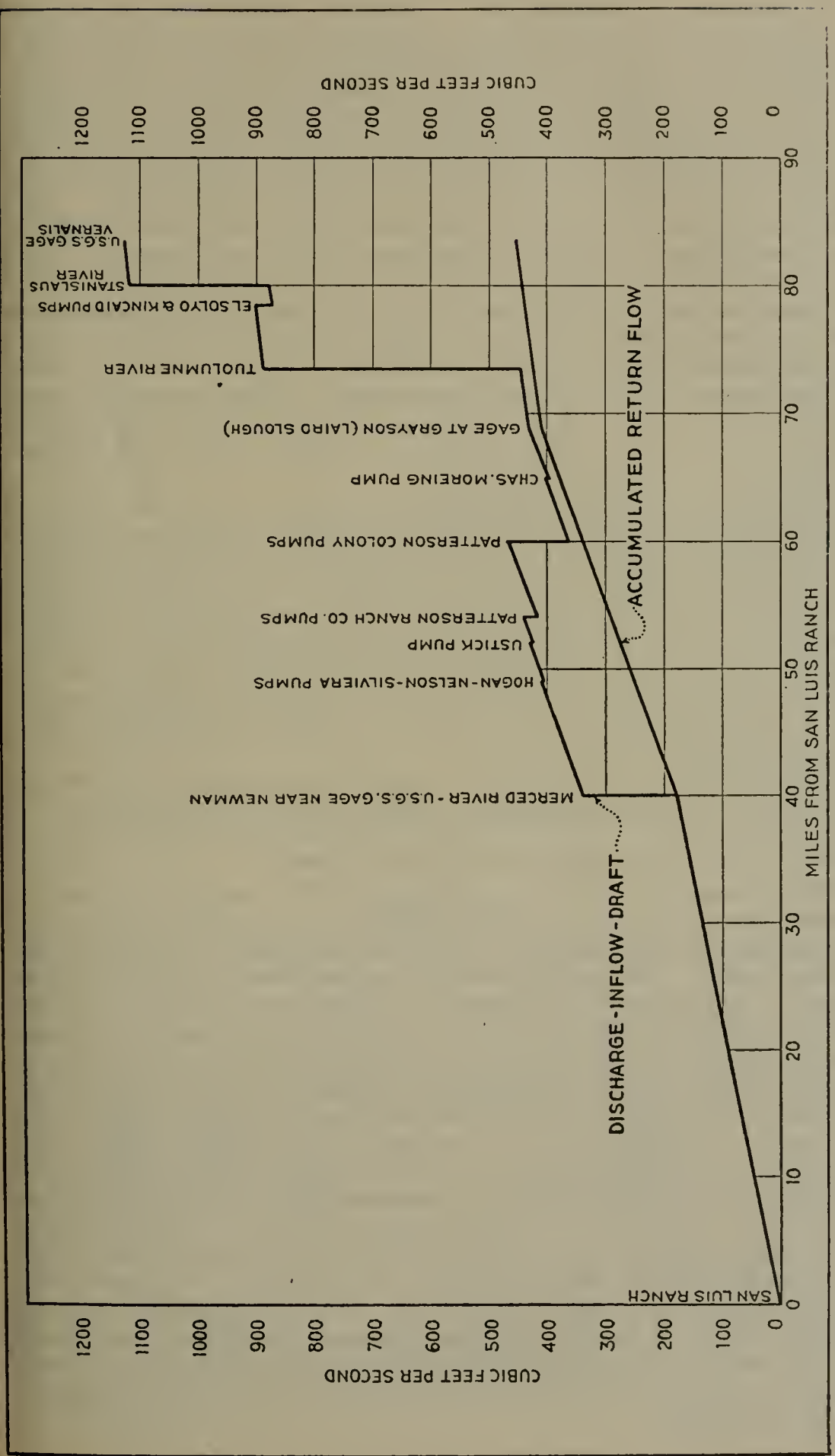

PLATE 6—San Joaquin River Return Flow, San Luis Ranch to Vernalis, July 1 to September 30, 1928

the Tuolumne River where the La Grange power plant of Turlock Irrigation District was operated. These power releases could not be considered as return water and segregation from the latter was difficult. In 1928, to avoid these difficulties in measuring the return flow, permanent gaging stations were established at an upper and lower point on each stream. Each of these stations was rated by a number of current meter measurements and a continuous record of gage height was obtained from the latter part of June to early October either by automatic water registers or local observers. With a continuous record of the discharge at each station, the return water was computed as a monthly total in acre-feet, and with the monthly total in acre-feet of the power releases available, any error in the return water figures due to inclusion of power water was avoided. Under this method, however, it was required that the total pumping diversions beteen the upper and lower stations on each stream be recorded. Sufficient measurements were therefore made at these pumping plants to determine a close estimate of their diversions in the period from July to September, inclusive.

The stations used in the 1928 return water measurements are as follows: Merced River, Yosemite Valley Railroad crossing near Snelling and bridge on the Hills Ferry road; Tuolumne River, Roberts Ferry bridge and Tuolumne city; Stanislaus River, Orange Blossom bridge and Elliot ranch; San Joaquin River, San Luis ranch and Vernalis. On the San Joaquin River two intermediate stations were also used, one near Grayson (Laird Slough) and the other just below the junction with the Merced River. The latter is a station maintained by the U. S. Geological Survey and referred to as the "San Joaquin River near Newman."

Tables 123, 128, 133, 138, 140, and 145 present the results of the 1928 return flow measurements as taken under the revised plan.

Increased San Joaquin Flow Due to Power Releases.

The increased flow, at times, in the lower San Joaquin River and its tributaries due to power water releases has been mentioned above in connection with the revision, in 1928, of the methods of return water measurements. This augmentation of the river flow, while not "return flow" is important. In September, 1926, the Tuolumne and San Joaquin River flow was increased to a considerable extent by the operation of the La Grange plant of the Turlock Irrigation District and in 1927 it is estimated that the increase in flow in the lower San Joaquin due to power releases on the Stanislaus, Tuolumne and Merced rivers amounted to 2800 acre-feet in July, 9000 in August and 14,500 in September, or a total of 26,300 acre-feet. This represents an average flow in cubic feet per second for these months of 46 in July, 146 in August, and 244 in September. In 1928, increased flow on the Tuolumne River from power releases began at the last of August and amounted to over 400 second-feet for the greater part of September. It would seem, therefore, that with the development of irrigation storage and by-product power on San Joaquin Valley streams, much needed additional flow in considerable quantities in certain periods throughout the season may become available to the lower river and delta region through the power operations.

Comparison of San Joaquin Return Flow and Diversions.

In Tables 146 to 149, inclusive, the data have been compiled for a comparison between the return water as measured in the lower San Joaquin River and the total diversions, both on the San Joaquin and its tributaries, from which the return is derived. In these tables the measured return for each month is compared to the diversions for the same month. There is some evidence of a considerable "lag" between diversions and return to the San Joaquin River, in which case a comparison of the return and diversions for the same month might be somewhat in error. On the other hand, there is also evidence pointing to a surprisingly rapid response in the return water to diversions considerably remote. Any error in this respect which may or may not occur in the monthly percentages shown in these tables is probably more or less ironed out in the results for the combined two- or three-month period as computed for each year.

A summary of the yearly return water percentages, and the amount in second-feet of the return flow above the Vernalis gage, is given in columns 8, 9, and 10 of Table 115. This table affords also a comparison between San Joaquin and Sacramento (subsequently described) return water data. It would appear that the average percentage of diversions occurring as return water in the San Joaquin River is considerably smaller than that for the Sacramento River. This difference is probably attributable to the fact that whereas, due to basin topography, practically all drainage from Sacramento River diversions is very quickly returned to the river, in the San Joaquin Valley much of the drainage from foothill diversions passes to the underground water and may from there, in many lower areas, be returned by drainage pumps to the surface for re-use in the irrigation canals. Considerable of the San Joaquin return, therefore, may never reach the river to be accounted for in the return water measurements.

TABLE 115

COMPARATIVE SACRAMENTO AND SAN JOAQUIN RETURN WATER DATA, 1924 TO 1928

Year	Sacramento River						San Joaquin River		
	Yearly run-off Sacramento River at Red Bluff in per cent of normal	Rice acreage irrigated from Sacramento River	Seasonal return in per cent of draft		*Total return to river average sec.-ft.		Return water average for July August and September in per cent of draft	Return above Vernalis gage, average sec.-ft.	
			As measured in definite return channels only	Including all accretions	July	August		August	September
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1924	31	59,700	22	33	734	785	35	595	592
1925	81	58,000	40	59	1,620	1,320	38	1,030	1,100
1926	57	87,500	31	49	1,570	1,240	28	895	838
1927	111	79,800	39	59	2,150	2,000	32	1,510	1,460
1928	77	63,500	37	49	1,440	1,330	28	1,150	1,140

* Excludes foreign return.

Sacramento Return Waters.

The conditions surrounding return water entering the Sacramento River differ considerably from those on the San Joaquin. In the Sacramento Valley a large percentage of the return flow follows the troughs in the basins on either side of the river and is discharged to the latter through well defined channels entering at considerable distances downstream from the diversion sources. Gaging stations have been maintained each season on all of these channels which are, in downstream order of their discharge to the river: Butte Slough, Reclamation District 70 Drain, Reclamation District 108 Drain at Rough and Ready Bend, the Back Borrow Pit of reclamation districts 108 and 787 (carrying water from Colusa Basin) joining the river just above Knights Landing, Sacramento Slough joining the river just above its confluence with the Feather River (carrying Reclamation District 1500 drainage and drainage down the east and west borrow pits of the Sutter By-pass), Reclamation District 1000 Drain (Pritchard Lake), Conaway Ranch drainage (discharged to the river through the irrigation plant in the latter part of the season), Reclamation District 1000 Drain (Second Bannon Slough), the Back Borrow Pit of Reclamation District 1000, and Reclamation District 1600 Drain.

Between Colusa and Red Bluff there are no large well-defined return channels. Records or estimates of all natural inflow from streams in this stretch of the river have been, however, obtained. On the upper end of the river between Redding and a point below Cottonwood there is a considerable return from the irrigation of the Anderson-Cottonwood Irrigation District which reaches the river through the natural creeks in this territory and enters above the Red Bluff (Iron Canyon) gaging station. Estimates of this return water are given in the footnotes at the end of Tables 71 to 75, inclusive, Chapter III.

As outlined in Chapter II, discharge records are obtained each season for stations on the Sacramento River at Red Bluff, Butte City, Colusa, Knights Landing, Verona and Sacramento. With these records and those for the inflow of the Feather and American rivers available, and with all diversions between the river gaging stations recorded (see Chapter III), it is possible to compute what should represent the total water returned to the river between each station, including not only the flow entering through definite channels which is measured as previously described, but all seepage, ground water return, etc., which can not be directly measured. Records of the total return water derived in this manner, as well as for that obtained through the measurements on the drainage channels, will be found in the tables of this chapter.

Return Flow From Foreign Sources.

It is to be noted that two main and one or two minor channels carrying return water to the Sacramento River derive their discharge from "foreign" sources.

Of the flow entering the Sacramento River through Butte Slough, nearly all is that resulting from Feather River diversions through the Western and Sutter-Butte canals. In a dry season there is no water flowing in Butte Creek in the vicinity of the East Side Highway and in such a season, therefore, the measured inflow from Butte Slough

to the river is all return water. In normal seasons, however, there is some natural flow in Butte Creek at the East Side Highway and in order to determine the inflow to the river from Butte Slough which is strictly return water, the measuring station on Butte Creek one mile west of the East Side Highway is maintained. Of the discharge making up the inflow to the river through Sacramento Slough, that portion which flows down the East Borrow Pit of the Sutter By-pass (measured near Chandler Station) is practically all return water from Feather River irrigation. Likewise, the water measured in the Back Borrow Pit of Reclamation District 1000 is probably not derived from Sacramento River sources.

In any summation, therefore, of return water from Sacramento River diversions only, it is necessary to exclude the portion of Sacramento Slough discharge as above noted as well as practically all of the return through Butte Slough and such other minor return from foreign sources as may be noted.

Relation of Sacramento Return Water to Irrigation Draft.

In presenting figures of return flow, those giving the relation of the return to the irrigation draft on the river are perhaps of greatest significance. Tables 151, 153, 155, 157 and 159 show this relation, 1924 to 1928, for that return water only which was measured at the well defined return channels (see previous description), and Tables 152, 154, 156, 158, 158-A and 160 give the relation for the total return (including all accretions) between each river station computed as explained in a preceding paragraph. The tables show that the seasonal seepage, ground water return, etc., which can not be directly measured varied from a minimum of 11 per cent of the irrigation draft in 1924 to a maximum of 20 per cent in 1927; that the seasonal return as measured at the definite return channels varied from 22 per cent of the irrigation draft in 1924 to 40 per cent in 1925; and that the total return, including all accretions, varied from 33 per cent of the irrigation draft in 1924 to 59 per cent in 1925 and 1927.

Comparative Return Water, 1924 to 1928.

The preceding figures for the return water percentages are further shown in columns 4 and 5 of Table 115, page 245, which shows also, in columns 6 and 7, the amount of the total return, in second-feet, for July and August of each year. For comparative purposes this table shows also, in columns 2 and 3, the yearly run-off of the Sacramento River at Red Bluff in per cent of normal, and the rice acreage irrigated directly from the river.

For the Sacramento return water it would seem that with the rice acreage about the same, the return water percentage is greater in the seasons of greater run-off. This is perhaps due to a greater accretion from ground water storage, etc., in the seasons of good run-off, and if so, the additional return from this source should not, strictly speaking, be included in the percentage figures since this would not be a return derived from the irrigation draft. However, it may be that, in years of good run-off, with a less urgent demand for conservation, the greater facility in irrigation operations obtained by larger diversions and cor-

respondingly greater waste and spill, would offer an explanation of the greater return water percentages. This would be indicated in a comparison from year to year, of the gross, or headgate, duty of water of the various projects, making due allowance, of course, for the ratio of rice to general crops and any other factors which would influence the gross duty from one year to another.

Return Water in Colusa Trough at Colusa-Williams Highway.

Except perhaps for a short period at the beginning of the irrigation season, all flow in the Colusa Trough (main drain of Reclamation District 2047) at the Colusa-Williams Highway is return water and this location was selected for the maintenance of a gaging station which would record this return from a particularly representative Sacramento Valley rice and general crop area of about 185,000 acres under irrigation from the Sacramento River. The same flow with downstream accretions or losses is again measured at the station referred to as "Colusa Basin Drainage at Knights Landing." At the Colusa-Williams Highway the "Trough" carries practically the entire return from the Glenn-Colusa, Compton-Delevan, Jacinto, Maxwell, Princeton-Codora-Glenn, and Provident Irrigation districts. Tables 161 to 165, inclusive, show the return water as measured at this point and give the percentage relationship between the return and the diversions from which it is derived.

It is to be noted that in some years the average flow in the Trough has been as much as 500 second-feet or more for two or three months during the season. This means that 500 second-feet or more "by-passed" a stretch on the Sacramento River from points above Colusa to the junction of the Trough water with the river at Knights Landing. Were this water to remain in the river in times of low flow, the navigation situation would, of course, be improved just to that extent. It has been suggested, therefore, that a connecting channel between the Trough and the river should be constructed so that the Trough water might be returned to the river at Colusa. With any demand for elimination of the present "by-passing," the construction of this connecting channel seems to be the only solution other than that of strictly enforced elimination of waste and spill from the rice fields thereby permitting a reduction in the river diversions to the extent of the waste and spill elimination.

Return Water, Reclamation Districts 108 and 1500.

Similar to the determination of the return water for a particularly representative area as in the case of the station on the Colusa Trough at the Colusa-Williams Highway, the separate return water data for Reclamation Districts 108 and 1500 have been tabulated. Each of these districts comprises an individual unit in which all diversions to the area within the surrounding levees have been measured and for which a record of the water either pumped or discharged by gravity from the district is available. In each case the water is discharged from the district at a single location. For District 108 the discharge is to the Sacramento River at Rough and Ready Bend and for District 1500 the discharge is to Sacramento Slough in Sutter By-pass. The approximate areas of Districts 108 and 1500 are 58,000 and 68,000 acres,

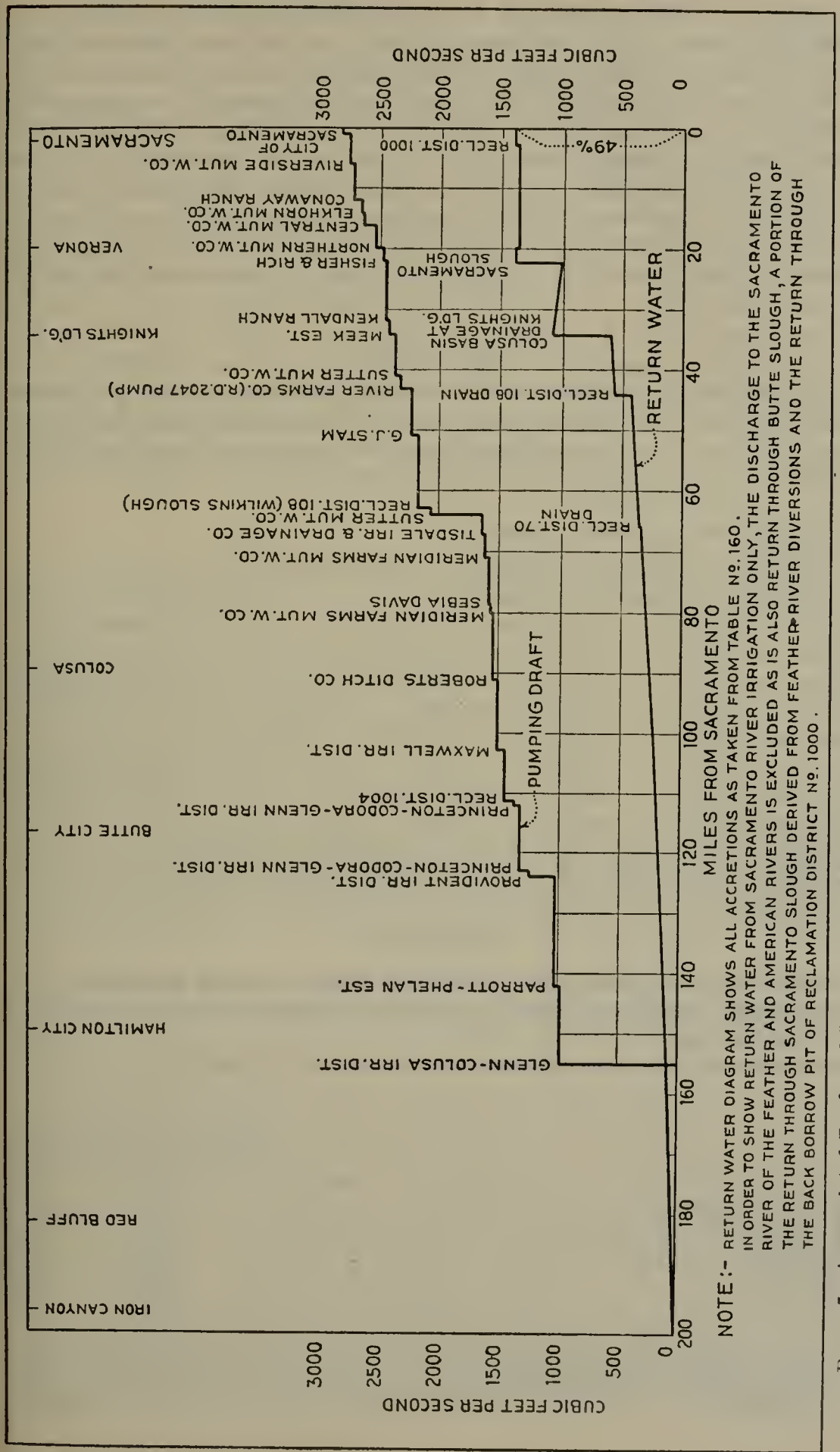

PLATE 7—Accumulated Draft and Return Flow, Sacramento River, Red Bluff to Sacramento, June 1 to September 30, 1928

respectively. Tables 166 and 167 show the comparison between diversions and return water in these districts, for the years 1924 to 1928. In the case of District 1500 it is to be noted that beginning with the 1926 season, the drainage discharge has been entirely by pumping, whereas in previous years, it was by a combination of gravity outlet and pumping (when necessary). At the time of the change in 1926, the average water level in the drain was lowered three feet below the 1925 level. The water table throughout the district was therefore more or less drawn down and this additional source of drainage (not strictly return water) may explain the high return water percentage shown for 1926.

In District 108 it appears that the return water percentage has increased each year since 1925. The only apparent explanation for this increase is that methods of rice irrigation have probably changed each year so that more and more water has been allowed to flow through the checks and out the tail-gates in order to leech out alkali salts and otherwise keep fresher water in the fields.

Quality of Return Water—Tests.

Discussion has been had relative to the fitness for irrigation of some return waters, especially those from the rice fields located in a more or less alkali area. In order to obtain some idea, therefore, of the difference in salts and alkali content between the Sacramento River water and that in the Colusa Trough, a few samples of water were taken and tested during the 1924 season. The testing was done by the chemical laboratory of the State Division of Highways.

On July 30th, a sample was taken of the Colusa Trough water at the Maxwell Road and at the same time one was taken from the adjacent Maxwell Irrigation District canal carrying water diverted from the Sacramento River at the pumping plant about seven miles distant. The results of the tests of these two samples are given in Table 116.

TABLE 116

TESTS OF WATER SAMPLES FROM THE COLUSA TROUGH AND FROM CANAL WATER DIVERTED FROM THE SACRAMENTO RIVER, 1924

Test	Parts per million	
	Return water in Colusa Trough	Canal water from Sacramento River
Alkalinity bicarbonates	207.00	121.00
Alkalinity carbonates	000.00	000.00
Total hardness	164.00	156.00
Sulphates as SO^4	0.50	1.50
Chlorides as Cl	65.00	65.00
Alkali as Na	49.00	19.00
Alkali coefficient*	24.00	107.00
Alkali rating	Good	Good

* Alkali coefficient is the depth in inches of water which on evaporation would yield sufficient alkali to render a four-foot depth of soil injurious to the most sensitive crops.

NOTE—Samples taken on July 30, 1924, at the Colusa Trough and Maxwell Irrigation District canal crossing of the Maxwell Road.

Early in the fall the rice fields are drained of all of the water which has been ponded during the summer, and at this time, therefore, there is a considerable increase in the return to the Sacramento River of such water. To show the difference in the alkali content of the river water before and at the peak of this fall drainage samples were taken from the river at Elkhorn Ferry, about 12 miles above Sacramento, one on August 18th, and the other on September 12th. On September 12th, also, a sample was taken from the Back Borrow Pit of District 787 just above its junction with the river. The Borrow Pit was carrying all of the drainage from Colusa Basin. The results of the tests of these three samples are given in Table 117.

TABLE 117

TESTS OF SACRAMENTO RIVER WATER BEFORE AND AT THE PEAK OF THE RICE FIELD DRAINAGE AND OF COLUSA BASIN DRAINAGE AT THE PEAK, 1924

Test	Parts per million		
	River water at Elkhorn Ferry on August 18	River water at Elkhorn Ferry on September 12	Colusa Basin drainage at Knights Landing on September 12
Total solids	333	316	582
Suspended solids	10	37	73
Dissolved solids	323	297	509
Bicarbonates	158	134	260
Total hardness	210	198	213
Temporary hardness	130	117	85
Permanent hardness	80	81	298
Chlorine as Cl	64	60	82
Sulphates as SO_4	47	27	95
Alkali coefficient	32	34	24
Alkali rating	Good	Good	Good

NOTE—Elkhorn Ferry is located about 12 miles above Sacramento. The sample of Colusa Basin drainage water was taken from the Back Borrow Pit of District 787 just above its junction with the Sacramento River at Knights Landing, which is located about 34 miles above Sacramento.

Of the flow at Elkhorn Ferry on August 18, the return from District 70 drain, District 108 drain, Colusa Basin and Sacramento Slough amounted to 44%. On September 12, the return from these same channels, although greater, was only 24% of the flow at Elkhorn Ferry because of the increased river flow due to decreased draft.

Unfortunately, for the value of the comparison, the return from District 70 drain, District 108 drain, Colusa Basin and Sacramento Slough (representing practically the total of return water similar to Colusa Basin water) on August 18th amounted to 44 per cent of the river flow at Elkhorn Ferry, whereas on September 12 the return from these same channels, although greater in amount, was only 24 per cent of the Elkhorn Ferry flow because of the increased river flow due to reduction in diversions. This may account for the fact that the September 12th test appears to differ very little from the August 18th test although a large quantity of return water of considerable hardness and low alkali coefficient, as shown by the September 12th Colusa Basin Drainage test, was entering the river.

In 1928, some additional water samples of river and drainage water for complete analysis were taken on September 7th which was the approximate time of the maximum drainage from the rice fields. River samples were taken at Knights Landing both above and below the

point of discharge to the river of Colusa Basin Drainage, and at Sacramento. Samples of drainage or return water were taken from Colusa Basin Drainage at Knights Landing and from Sacramento Slough in the Sutter By-pass (carrying Reclamation District 1500 and Sutter County rice drainage).

These samples were tested by a San Francisco laboratory through the courtesy of and in cooperation with the California-Hawaiian Sugar Refining Corporation. The results are given in Table 118.

At the time of these tests the discharges in second-feet of the river and drainage channels were as follows: Sacramento River at Knights Landing, 2840; at Sacramento, 4080; Colusa Basin Drainage at Knights Landing, 614; Sacramento Slough, 660.

TABLE 118

TESTS OF SACRAMENTO RIVER AND DRAINAGE WATER, 1928

(Samples taken September 7, 1928)

Test Hypothetical form of combination	Parts per million				
	Sample No. 1 Sacramento River at Knights Landing *above* Colusa Basin drainage, inflow	Sample No. 2 Sacramento River at Knights Landing *below* Colusa Basin drainage, inflow	Sample No. 3 Sacramento River at Sacramento between I and M St. bridges	Sample No. 4 Back borrow pit at Knights Landing (Colusa Basin drainage just above junction with Sacramento River)	Sample No. 5 Sacramento Slough in Sutter By-pass below reclamation district 1500 pumps
Sodium sulphate	22	23	28	60	
Sodium chloride	23	23	64	58	185
Sodium carbonate	7			37	
Magnesium chloride					31
Iron oxide and alumina	1	1	1	4	1
Calcium sulphate					28
Calcium carbonate	41	41	51	49	79
Magnesium carbonate	39	47	56	54	93
Silica	26	25	25	26	34
Organic matter and combined water	6	12	13	20	33
Hardness (calculated as calcium carbonate)	87	96	117	113	209
Total solids	165	172	238	308	484

TABLE 119

RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS DURING THE IRRIGATION SEASON, 1924

(Cubic feet per second)

Stream	Date	Measured flow	Total diversions (added)	Return flow
San Joaquin River:				
Vernalis gaging station	June 25-27	500	*113	613
	Aug. 1- 3	433	*80	513
	Sept. 10-12	408	*76	484
Stanislaus River:				
½ mile above San Joaquin River	June 27-29	95	24	119
	Aug. 3	118	0	118
	Sept. 12-14	95	8	103
Tuolumne River:				
3 miles above San Joaquin River	June 27-28	256	0	256
	Aug. 2- 3	258	0	258
	Sept. 11-12	245	0	245
Dry Creek:				
1 mile above Tuolumne River	June 28-30	27	2	29
	Aug. 4- 5	31	0	31
	Sept. 13	28	0	28
Merced River:				
1 mile above San Joaquin River	July 1	21	94	115
	Aug. 1	2	97	99
	Sept. 10	15	91	106

* Includes diversions on San Joaquin River only. All diversions at the time of measurements were noted.

TABLE 120

RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS DURING THE IRRIGATION SEASON, 1925

(Cubic feet per second)

Stream	Date	Measured flow	Total diversions (added)	Return flow
San Joaquin River:				
Vernalis gaging station	July 27, 1925	1,210	*159	1,369
	Sept. 1, 1925	690	*117	807
	Oct. 1, 1925	1,320	*24	1,344
Stanislaus River:				
½ mile above San Joaquin River	July 27, 1925	247	0	247
	Sept. 1, 1925	161	0	161
	Oct. 1, 1925	206	7	213
Tuolumne River:				
3 miles above San Joaquin River	July 27, 1925	347	13	360
	Sept. 1, 1925	299	13	312
	Oct. 6, 1925	**423	0	423
Dry Creek:				
1 mile above Tuolumne River	July 30, 1925	32	0	32
	Sept. 3, 1925	40	0	40
	Oct. 5, 1925	42	0	42
Merced River:				
1 mile above San Joaquin River	July 24, 1925	131	89	220
	Aug. 29, 1925	73	43	116
	Sept. 29, 1925	91	37	128

*Includes diversions on San Joaquin River only. All diversions at the time of measurements were noted.
**The mean daily release of 276 second-feet from La Grange Power Plant for October 3, 4 and 5, 1925, has been subtracted from the measured flow to give this figure.

TABLE 121

RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS DURING THE IRRIGATION SEASON, 1926

(Cubic feet per second)

Stream	Date	Measured flow	Total diversions (added)	Return flow
San Joaquin River:				
Vernalis gaging station	July 19, 1926	700	*188	888
	Aug. 29, 1926	595	*193	788
	Sept. 30, 1926	595	*131	726
Stanislaus River:				
4 miles above San Joaquin River	July 20, 1926	111	13	124
	Aug. 30, 1926	139	22	161
	Sept. 30, 1926	101	29	130
Tuolumne River:				
3 miles above San Joaquin River	July 13, 1926	295	17	312
	Aug. 26, 1926	286	10	296
	Sept. 30, 1926	317	0	317
Dry Creek:				
1 mile above Tuolumne River	July 19, 1926	32	0	32
	Aug. 28, 1926	31	3	34
	Sept. 28, .926	----------	0	----------
Merced River:				
1 mile above San Joaquin River	July 15, 1926	90	50	140
	Aug. 24, 1926	53	88	141
	Sept. 29, 1926	73	38	111

* Includes diversions from San Joaquin River only (below San Luis Ranch).

TABLE 122

RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS DURING THE IRRIGATION SEASON, 1927

(Cubic feet per second)

Stream	Date	Measured flow	Total diversions (added)	*Deductions for power releases, spill, etc., not return water	Return flow
San Joaquin River:					
Vernalis gaging station	Aug. 4, 1927	1,540	**226	50	1,720
	Sept. 1, 1927	1,660	**194	573	1,280
	Oct. 7, 1927	2,330	**37	839	1,530
Stanislaus River:					
4 miles above San Joaquin River (Elliot Ranch)	Aug. 4, 1927	275	0	50	225
	Sept. 1, 1927	294	6	73	227
	Oct. 7, 1927	370	0	19	351
Tuolumne River:					
3 miles above San Joaquin River (Tuolumne City)	Aug. 3, 1927	391	10	0	401
	Aug. 31, 1927	845	0	500	345
	Oct. 6, 1927	1,048	0	670	378
Dry Creek:					
1 mile above Tuolumne River	Aug. 5, 1927	59	1	0	60
	Sept. 2, 1927	53	0	0	53
	Oct. 8, 1927	78	0	0	78
Merced River:					
1 mile above San Joaquin River	Aug. 1, 1927	233	55	0	288
	Aug. 30, 1927	204	53	0	257
	Oct. 4, 1927	527	16	150	393

* See notes, tables 127, 132, 137, and 144.
** Includes diversions from San Joaquin River only.

TABLE 123

RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS DURING THE IRRIGATION SEASON, 1928

	July		August		September		July to September, inclusive	
	Acre-feet	Average, second-feet	Acre-feet	Average, second-feet	Acre-feet	Average, second-feet	Acre-feet	Average, second-feet
San Joaquin River:								
Discharge at San Luis Ranch	24		0	0	0	0	24	
Discharge near Vernalis (U. S. G. S. station at Durham Ferry Bridge)	69,500	1,130	*56,500	*919	*79,100	*1,330	*205,100	*1,130
Inflow of Merced, Tuolumne and Stanislaus rivers	48,400	787	*42,800	*696	*63,400	*1,070	*154,600	*852
Accretion—exclusive of tributary streams, San Luis Ranch to Durham Ferry Bridge	21,100	343	13,700	223	15,700	264	50,500	278
Total diversions, San Luis Ranch to Durham Ferry Bridge	11,854	193	10,574	172	8,925	150	31,353	170
Total return flow—exclusive of tributary streams, San Luis Ranch to Durham Ferry Bridge	32,954	536	24,274	395	24,625	414	81,853	448
Stanislaus River:								
Discharge at Orange Blossom Bridge	2,170	35	2,250	37	2,140	36	6,560	36
Discharge at Elliot Ranch	17,700	288	14,400	234	12,100	204	44,200	242
Accretion, Orange Blossom Bridge to Elliot Ranch	15,530	253	12,150	197	9,960	168	37,640	206
Total diversions, Orange Blossom Bridge to Elliot Ranch	1,248	20	1,277	21	1,089	18	3,614	20
Total return flow, Orange Blossom Bridge to Elliot Ranch	16,778	273	13,427	218	11,049	186	41,254	226
Tuolumne River:								
Discharge at Roberts Ferry Bridge	2,830	46	*3,960	*64	*27,900	*469	*34,690	*190
Discharge at Tuolumne City Bridge	19,000	309	*19,800	*322	*42,400	*713	*81,200	*444
Inflow of Dry Creek	2,936	48	2,945	48	2,985	50	8,866	48
Accretion—exclusive of Dry Creek, Roberts Ferry Bridge to Tuolumne City Bridge	13,234	215	12,895	210	11,515	194	37,644	206
Total diversions, Roberts Ferry Bridge to Tuolumne City Bridge	327	5	277	4	79	1	683	4
Total return flow—exclusive of Dry Creek, Roberts Ferry Bridge to Tuolumne City Bridge	13,561	220	13,172	214	11,594	195	38,327	210
Dry Creek:								
Discharge near Old Waterford Bridge	407	7	450	7	463	8	1,320	7
Discharge at Modesto Bridge	2,936	48	2,945	48	2,985	50	8,866	48
Accretion, Old Waterford Bridge to Modesto Bridge	2,529	41	2,495	41	2,522	42	7,546	41
Total diversions, Old Waterford Bridge to Modesto Bridge	9		2		2		13	
Total return flow, Old Waterford Bridge to Modesto Bridge	2,538	41	2,497	41	2,524	42	7,559	41
Merced River:								
Discharge at Yosemite Valley railroad crossing	1,208	20	1,805	29	1,390	23	4,403	24
Discharge at bridge on Hills Ferry Road	11,700	191	8,600	140	8,920	150	29,220	160
Accretion, Yosemite Valley railroad crossing to bridge on Hills Ferry Road	10,492	171	6,795	111	7,530	127	24,817	136
Total diversions, Yosemite Valley railroad crossing to bridge on Hills Ferry Road	3,451	56	3,027	49	2,343	39	8,821	48
Total return flow, Yosemite Valley railroad crossing to bridge on Hills Ferry Road	13,943	227	9,822	160	9,873	166	33,638	184

* Includes water released to Tuolumne River from Don Pedro reservoir through La Grange power plant as follows: August 1,140 acre-feet or 19 second-feet average flow; September, 23,700 acre-feet or 398 second-feet average flow.

TABLE 124

SAN JOAQUIN RIVER RETURN WATER MEASUREMENTS, 1924

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
San Joaquin River at San Luis Ranch	June 25, 1924		Dry	Aug. 1, 1924		Dry	Sept. 10, 1924		Dry
Merced River near mouth	June 25, 1924		38	Aug. 1, 1924		2	Sept. 10, 1924		15
San Joaquin River above Merced River	June 25, 1924		31	Aug. 1, 1924		12	Sept. 11, 1924		9
San Joaquin River at Crows Landing	June 26, 1924		93	Aug. 2, 1924		39	Sept. 11, 1924		49
Patterson Colony	June 26, 1924	106		Aug. 2, 1924	70		Sept. 11, 1924	66	
San Joaquin River below Patterson Pump	June 26, 1924		19	Aug. 2, 1924		Dry	Sept. 11, 1924		Dry
San Joaquin River at Grayson (Laird Slough)	June 27, 1924		62	Aug. 2, 1924		43	Sept. 11, 1924		36
Tuolumne River 3 miles above mouth	June 27, 1924		256	Aug. 3, 1924		258	Sept. 12, 1924		245
El Solyo pumps	June 27, 1924	7		Aug. 3, 1924	0		Sept. 12, 1924	0	
Kincaid pumps	June 27, 1924	0		Aug. 3, 1924	10		Sept. 12, 1924	10	
Stanislaus River 2 miles above mouth	June 27, 1924		98	Aug. 3, 1924		112	Sept 12, 1924		94
Diversion from Stanislaus 1½ miles above mouth	June 27, 1924	8		Aug. 3, 1924	0		Sept. 12, 1924	0	
Drainage ditch at mouth of Stanislaus River	June 27, 1924		5	Aug. 3, 1924		6	Sept. 12, 1924		1
San Joaquin River near Vernalis	June 27, 1924		500	Aug. 3, 1924		433	Sept. 12, 1924		408

* Measurements listed in downstream order.

18—68336

TABLE 125

SAN JOAQUIN RIVER RETURN WATER MEASUREMENTS, 1925

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
San Joaquin River at San Luis Ranch	July 24, 1925		Dry	Aug. 29, 1925		Dry	Sept. 29, 1925		Dry
Merced River near mouth	July 24, 1925		131	Aug. 29, 1925		73	Sept. 29, 1925		91
San Joaquin River above Merced River	July 24, 1925		286	Aug. 29, 1925		55	Sept. 30, 1925		36
San Joaquin River at Crows Landing	July 25, 1925			Aug. 31, 1925		177	Sept. 30, 1925		165
Patterson Colony Diversion	July 25, 1925	125.0		Aug. 31, 1925	107.0		Oct. 1, 1925		
San Joaquin River below Patterson Pump	July 25, 1925		439	Aug. 31, 1925		123	Oct. 1, 1925		229
San Joaquin River at Grayson (Laird Slough)	July 25, 1925			Aug. 31, 1925		198	Oct. 1, 1925		259
Tuolumne River three miles above mouth	July 27, 1925		347	Sept. 2, 1925		299	Oct. 6, 1925		699
El Solyo pumps	July 27, 1925	17.7		Sept. 1, 1925	0		Oct. 1, 1925	17.7	
Kincaid pumps	July 27, 1925	10.0		Sept. 1, 1925	10.0		Oct. 1, 1925	6.6	
Stanislaus Farms Diversion	July 27, 1925	6.6		Sept. 1, 1925	0		Oct. 2, 1925	0	
Stanislaus River two miles above mouth	July 27, 1925		232	Sept. 1, 1925		151	Oct. 1, 1925		199
Modesto Irrigation District drain ditch ½ mile above mouth of Stanislaus River	July 27, 1925		15	Sept. 1, 1925		10	Oct. 1, 1925		7
San Joaquin River near Vernalis	July 27, 1925		1,210	Sept. 1, 1925		690	Oct. 1, 1925		1,320

*Measurements are listed in downstream order.

TABLE 126

SAN JOAQUIN RIVER RETURN WATER MEASUREMENTS, 1926

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
San Joaquin River at San Luis Ranch	July 14, 1926		Dry	Aug. 24, 1926		Dry	Sept. 29, 1926		Dry
San Joaquin River above Merced River	July 15, 1926		104	Aug. 24, 1926		35	Sept. 29, 1926		22
Merced River near mouth	July 15, 1926		90	Aug. 24, 1926		53	Sept. 29, 1926		73
San Joaquin River at Crows Landing	July 17, 1926		242	Aug. 27, 1926		148	Sept. 29, 1926		120
Upper Patterson Pump 20 in.	July 17, 1926	0		Aug. 27, 1926	11.0		Sept. 29, 1926	13.0	
Lower Patterson pumps	July 17, 1926	120.0		Aug. 27, 1926	120.0		Sept. 29, 1926	80.0	
San Joaquin River below Patterson pump	July 17, 1926		199	Aug. 27, 1926		79	Sept. 29, 1926		106
Moreing pump 15 in.	July 17, 1926	7.0		Aug. 27, 1926	4.0		Sept. 29, 1926	0	
San Joaquin River at Grayson (Laird Slough)	July 13, 1926		288	Aug. 27, 926		117	Sept. 30, 926		146
Burkhart pumps 2-16 in.	July 17, 1926	23.6		Aug. 27, 1926	20.7		Sept. 30, 1926	0	
Tuolumne River 3 miles above mouth	July 13, 1926		295	Aug. 26, 1926		299	Sept. 30, 1926		317
Stanislaus Farms pumps 2-12 in.	July 21, 1926	10.0		Aug. 27, 1926	10.0		Sept. 30, 1926	10.0	
El Solyo pumps 3-16 in.	July 17, 1926	17.7		Aug. 27, 1926	17.7		Sept. 30, 1926	17.7	
Kincaid pumps 3-12 in.	July 17, 1926	10.0		Aug. 27, 1926	10.0		Sept. 30, 1926	10.0	
Stanislaus River 2 miles above mouth	July 20, 1926		111	Aug. 30, 1926		139	Sept. 30, 1926		101
Modesto Irrigation District drain into Stanislaus River ½ mile above mouth	July 20, 1926		18	Aug. 30, 1926		12	Sept. 30, 1926		15
San Joaquin River near Vernalis	July 19, 1926		700	Aug. 29, 1926		595	Sept. 30, 1926		595

*Measurements are listed in downstream order.

TABLE 127

SAN JOAQUIN RIVER RETURN WATER MEASUREMENTS, 1927

Location of measurements[1]	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
San Joaquin River at San Luis Ranch	July 30, 1927		4	Aug. 29, 1927		Dry	Oct. 3, 1927		Dry
San Joaquin River above Merced River	Aug. 1, 1927		364	Aug. 30, 1927		167	Oct. 4, 1927		430
Merced River near mouth	Aug. 1, 1927		230	Aug. 30, 1927		204	Oct. 4, 1927		[2]507
San Joaquin River at Crows Landing	Aug. 1, 1927		793	Aug. 30, 1927		466	Oct. 4, 1927		933
Ustick pump	Aug. 1, 1927	10		Aug. 30, 1927	10		Oct. 4, 1927	0	
Upper Patterson pumps	Aug. 2, 1927	27		Aug. 30, 1927	27		Oct. 5, 1927	13	
Lower Patterson pumps	Aug. 2, 1927	131		Aug. 30, 1927	120		Oct. 5, 1927	0	
San Joaquin River below Patterson pumps	Aug. 2, 1927		730	Aug. 30, 1927		404			
Moreing pump	Aug. 2, 1927	10		Aug. 31, 1927	10		Oct. 5, 1927	0	
San Joaquin River at Grayson (Laird Slough)	Aug. 2, 1927		874	Aug. 31, 1927		479	Oct. 5, 1927		1,005
Burkhart pumps	Aug. 2, 1927	11		Aug. 31, 1927	0		Oct. 5, 1927	8	
Tuolumne River above mouth	Aug. 3, 1927		391	Aug. 31, 1927		[3]845	Oct. 6, 1927		[4]1,048
El Solyo pumps	Aug. 3, 1927	17		Aug. 31, 1927	17		Oct. 6, 1927	11	
Kincaid pumps	Aug. 3, 1927	20		Aug. 31, 1927	10		Oct. 6, 927	5	
Stanislaus River 4 miles above mouth (Elliott Ranch)	Aug. 4, 1927		[5]265	Sept. 1, 1927		[6]294	Oct. 7, 1927		[6]370
Modesto Irrigation District drain into Stanislaus River ½ mile above mouth	Aug. 4, 1927		10	Sept. 1, 1927		12	Oct. 7, 1927		14
San Joaquin River near Varnalis[7]	Aug. 4, 1927		[8]1,540	Sept. 1, 1927		[3]1,660	Oct. 7, 1927		[2, 4, 8] 2,330

[1] Measurements are listed in downstream order.
[2] Includes 150 second-feet released from Lake McClure in excess of canal diversion—not return water.
[3] Includes 500 second-feet due to releases through La Grange Power Plant from Don Pedro Reservoir by Turlock Irrigation District. This is not return water.
[4] Includes 670 second-feet due to power releases and possibly other spill, not return water.
[5] Includes an estimate of 50 second-feet released from Melones Reservoir in excess of canal diversions. Not return water.
[6] Includes some direct spill from canals to River which is not strictly "return water," as follows: Second series, 73 second-feet; third series, 19 second-feet.
[7] U. S. G. S. Station at Durham ferry bridge.
[8] Measurement October 7, 1927 at gage height of 7.35. Average flow for day is given by U. S. G. S. records as 2,270 second-feet.

TABLE 128

SAN JOAQUIN RIVER RETURN WATER AND DIVERSIONS, 1928

(Acre-feet except as noted)

Location of measurements[1]	July		August		September		July to September, Inclusive	
	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions
At San Luis Ranch	24		0		0		24	
Merced River near mouth (Hills Ferry road bridge)	11,700		8,600		8,920		29,220	
Pump near Hills Ferry Bridge		2		0		0		2
At Hills Ferry Bridge (U. S. G. S. Station "near Newman")	22,100		16,800		21,800		60,700	
Hogan		96		96		96		288
Nelson Brothers		18		40		11		69
Silviera		8		8		8		24
Ustick		180		160		210		550
Patterson Ranch Company		1,620		1,450		1,230		4,300
Patterson Colony		7,370		6,780		5,800		19,950
Charles Moreing		190		180		80		450
At Grayson (Laird Slough Bridge)	29,100		23,200		25,900		78,200	
Burkhart		200		120		20		340
Tuolumne River above mouth (Tuolumne City Bridge)	19,000		[3]19,800		[3]42,400		[3]81,200	
El Solyo Ranch		1,840		1,400		1,200		4,440
Kincaid		330		340		270		940
Stanislaus River above mouth (Elliott Ranch)	17,700		14,400		12,100		44,200	
Near Vernalis (U. S. G. S. Station at Durham Ferry Bridge)	69,500		[3]56,500		[3]79,100		[3]205,100	
Accretion (San Luis Ranch to Durham Ferry Bridge)	[2]21,100		[2]13,700		[2]15,700		[2]50,500	
Total diversions		11,854		10,574		8,925		31,353
Total return flow (San Luis Ranch to Durham Ferry Bridge)	[2]32,954		[2]24,274		[2]24,625		[2]81,853	
Total return flow (average second-feet)	[2]536		[2]395		[2]414		[2]448	

[1] Listed in downstream order.
[2] Exclusive of Merced, Tuolumne and Stanislaus inflow.
[3] Includes water released to Tuolumne River from Don Pedro reservoir through La Grange power plant as follows: (acre-feet) August 1,140, September 23,700; total 24,840.

TABLE 129

STANISLAUS RIVER RETURN WATER MEASUREMENTS, 1924

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Stanislaus River ½ mile above Oakdale bridge	June 29, 1924		15	Aug. 3, 1924		14	Sept. 14, 1924		14
Stanislaus River at Escalon bridge	June 29, 1924		56	Aug. 3, 1924		44	Sept. 14, 1924		43
Stanislaus River at Ripon bridge	June 29, 1924		100	Aug. 3, 1924		87	Sept. 14, 1924		88
River Junction Farms Company pumps	June 27, 1924	16		Aug. 3, 1924	0		Sept. 12, 1924	0	
Koetitz pumps	June 27, 1924	0		Aug. 3, 1924	0		Sept. 12, 1924	.8	
Stanislaus River 4 miles above mouth	June 27, 1924		98	Aug. 3, 1924		112	Sept. 12, 1924		94
Diversion on Elliot Ranch 4 miles above mouth	June 27, 1924	8		Aug. 3, 1924	0		Sept. 12, 1924	0	
Drainage canal at mouth of river	June 27, 1924		5	Aug. 3, 1924		6	Sept. 12, 1924		1

*Measurements are listed in downstream order.

TABLE 130

STANISLAUS RIVER RETURN WATER MEASUREMENTS, 1925

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Stanislaus River ½ mile above Oakdale bridge	July 29, 1925		19	Sept. 4, 1925		20	Oct. 2, 1925		35
Stanislaus River at Escalon bridge	July 29, 1925		74	Sept. 4, 1925		60	Oct. 2, 1925		78
Stanislaus River at Ripon bridge	July 29, 1925		153	Sept. 4, 1925		120	Oct. 2, 1925		168
Koetitz pumps	July 27, 1925	0		Sept. 1, 1925	0		Oct. 1, 1925	7	
Stanislaus River 4 miles above mouth	July 27, 1925		232	Sept. 1, 1925		151	Oct. 1, 1925		199
Modesto Irrigation District drain at mouth	July 27, 1925		15	Sept. 1, 1925		10	Oct. 1, 1925		7

*Measurements are listed in downstream order.

TABLE 131

STANISLAUS RIVER RETURN WATER MEASUREMENTS, 1926

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Stanislaus River ½ mile above Oakdale	July 20, 1926		15	Aug. 30, 1926		17			
Pacific Pea Packing Company pump 8 in.	July 20, 1926	3.0		Aug. 30, 1926	0		Sept. 30, 1926	0	
Stanislaus River at Escalon bridge	July 20, 1926		58	Aug. 30, 1926		50		0	
Stoddard pump, 10 in.	July 20, 1926	3.3		Aug. 30, 1926	0		Sept. 30, 1926		
Stanislaus River at Ripon bridge	July 20, 1926		110	Aug. 30, 1926		113			
Koetitz pump, 10 in.	July 20, 1926	6.6		Aug. 30, 1926	0		Sept. 30, 1926	6.6	
River Junction Farms Company pump, 18 in.	July 20, 1926			Aug. 30, 1926	22.0		Sept. 30, 1926	22.0	
Stanislaus River 4 miles above mouth	July 20, 1926		111	Aug. 30, 1926		139	Sept. 30, 1926		101
Modesto Irrigation District drain near mouth	July 20, 1926		18	Aug. 30, 1926		12	Sept. 30, 1926		15

*Measurements are listed in downstream order.

TABLE 132

STANISLAUS RIVER RETURN WATER MEASUREMENTS, 1927

Location of measurements*	First series[1]			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Stanislaus River at Orange Blossom bridge				Sept. 1, 1927		31	Oct. 7, 1927		29
Spill from canals to river—between Orange Blossom and Oakdale[2]				Sept. 1, 1927		13	Oct. 7, 1927		13
Stanislaus River 1 mile above Oakdale bridge				Sept. 1, 1927		77	Oct. 7, 1927		86
Spillway just above Escalon bridge from canal along north bank[2]				Sept. 1, 1927		60	Oct. 7, 1927		6
Stanislaus River at Escalon bridge				Sept. 1, 1927		214	Oct. 7, 1927		185
Stanislaus River at Ripon bridge				Sept. 1, 1927		276	Oct. 7, 1927		323
Koetitz pumps				Sept. 1, 1927	6		Oct. 7, 1927	0	
Updike pumps				Sept. 1, 1927	0		Oct. 7, 1927	0	
River Junction Farms Company pumps				Sept. 1, 1927	0		Oct. 7, 1927	0	
Stanislaus River at Elliot Ranch 4 miles above mouth	Aug. 4, 1927		[3]275	Sept. 1, 1927		294	Oct. 7, 1927		370
Stanislaus Farms Company (Elliott) pumps (just below river measurement point)	Aug. 4, 1927	10		Sept. 1, 1927	0		Oct. 7, 1927	0	
Modesto Irrigation District drain to river near mouth	Aug. 4, 1927		10	Sept. 1, 1927		12	Oct. 7, 1927		14

*Measurements are listed in downstream order.

[1]For a period from about July 29th to August 11th to satisfy an extra power load due to temporary break at the Drum Power Plant, the P. G. and E. Co., was drawing some water from Melones Reservoir in excess of the canal diversions of Oakdale and South San Joaquin Irrigation Districts. This caused a fluctuation in the river which would have rendered the return water measurements at the usual points of little value, hence a measurement was taken only near the mouth of the river where the fluctuations were probably smoothed out fairly well. On the second and third series the district canals were diverting practically all of the flow in the river. This is the usual condition throughout the summer, the irrigation and not the power demand being the control for release from Melones Reservoir.

[2] There is a certain amount of direct spill from the canals to the river. Strictly speaking, this is not "return water."

[3] Includes an estimate of 50 second-feet released at Melones in excess of canal diversions—not return water. (See note.[1])

TABLE 133

STANISLAUS RIVER RETURN WATER AND DIVERSIONS, 1928

(Acre-feet except as noted)

Location of measurements*	July		August		September		July to September, inclusive	
	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions
At Orange Blossom bridge	2,170		2,250		2,140		6,560	
Stoddard		9						9
D. F. Koetitz		47		112		82		241
Updike		27		33				60
Henry Pelucca		23		23		3		49
River Junction Farms (Wm. H. Beale)		472		485		403		1,360
Elliott		670		624		601		1,895
At Elliot Ranch (below pumps)	17,700		14,400		12,100		44,200	
Accretion-Orange Blossom bridge to Elliot Ranch	15,530		12,150		9,960		37,640	
Total diversions		1,248		1,277		1,089		3,614
Total return flow—Orange Blossom bridge to Elliot Ranch	16,778		13,427		11,049		41,254	
Total return flow (average second-feet)	273		218		186		226	

*Listed in downstream order.

TABLE 134

TUOLUMNE RIVER RETURN WATER MEASUREMENTS, 1924

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Tuolumne River at Roberts Ferry Bridge	June 28, 1924		35	Aug. 4, 1924		38	Sept. 13, 1924		29
Tuolumne River at Hickman Bridge	June 28, 1924		90	Aug. 4, 1924		109	Sept. 13, 1924		99
Tuolumne River above Dry Creek	June 28, 1924		175	Aug. 4, 1924		178	Sept. 13, 1924		168
Dry Creek at mouth	June 28, 1924		27	Aug. 5, 1924		31	Sept. 13, 1924		28
Tuolumne River 3 miles above mouth	June 27, 1924		256	Aug. 3, 1924		258	Sept. 12, 1924		245

*Measurements are listed in downstream order.

TABLE 135

TUOLUMNE RIVER RETURN WATER MEASUREMENTS, 1925

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Tuolumne River at Roberts Ferry Bridge	July 28, 1925		35	Sept. 5, 1925		50	Oct. 6, 1925		**57
Tuolumne River at Hickman Bridge	July 28, 1925		113	Sept. 5, 1925		119	Oct. 6, 1925		**225
Tuolumne River at Dry Creek	July 28, 1925		211	Sept. 5, 1925			Oct. 6, 1925		
Dry Creek at mouth	July 30, 1925		32	Sept. 3, 1925		40	Oct. 5, 1925		42
Duffie pump	July 28, 1925	6.6		Sept. 2, 1925	6.6		Oct. 6, 1925	0	
Bancroft pump	July 28, 1925	6.0		Sept. 2, 1925	6.0		Oct. 6, 1925	0	
Tuolumne River 3 miles above mouth	July 27, 1925		347	Sept. 1, 1925		299	Oct. 6, 1925		**423

*Measurements are listed in downstream order.
**The mean daily release of 276 second-feet from La Grange Power Plant for October 3, 4, and 5, 1925, has been substracted from the measured flow to give these figures.

TABLE 136
TUOLUMNE RIVER RETURN WATER MEASUREMENTS, 1926

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Tuolumne River at Roberts Ferry Bridge	July 16, 1926		32	Aug. 25, 1926		39			
Tuolumne River at Hickman Bridge	July 16, 1926		107	Aug. 25, 1926		102			
Tuolumne River ½ mile above Dry Creek	July 16, 1926		196	Aug. 26, 1926		210			
Dry Creek at mouth	July 19, 1926		32	Aug. 28, 1926		31			
Duffie pump, 10 in.	July 16, 1926	6.6		Aug. 26, 1926	0		Sept. 30, 1926	0	
Bancroft pumps, 10 in. and 12 in.	July 16, 1926	10.5		Aug. 26, 1926	10.0		Sept. 30, 1926	0	
Tuolumne River 3 miles above mouth	July 13, 1926		295	Aug. 26, 1926		286	Sept. 30, 1926		309

*Measurements are listed in downstream order.

TABLE 137
TUOLUMNE RIVER RETURN WATER MEASUREMENTS, 1927

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Tuolumne River at Roberts Ferry Bridge	Aug. 3, 1927		45	Aug. 31, 1927		**624	Oct. 5, 1927		[2]726
Tuolumne River at Hickman Bridge	Aug. 3, 1927		114	Aug. 31, 1927		**707			
Tuolumne River ½ mile above Dry Creek	Aug. 3, 1927		229	Aug. 31, 1927		[1]726			[3]
Dry Creek at mouth	Aug. 5, 1927		59	Sept. 2, 1927		53	Oct. 8, 1927		78
Bancroft pumps	Aug. 3, 1927	10		Aug. 31, 1927	0		Oct. 6, 1927	0	
Tuolumne River at Tuolumne City (3 miles above mouth)	Aug. 3, 1927		391	Aug. 31, 1927		[1]845	Oct. 6, 1927		[2]1,048

*Measurements arelisted in downstream order.

**Includes an estimate of 575 second-feet, not return water, due to releases through La Grange Power Plant from Don Pedro Reservoir by Turlock Irrigation District.

[1] Includes an estimate of 500 second-feet due to power releases (estimated that full amount due to releases had not reached lower points at time of measurements).

[2] Includes an estimate of 670 second-feet due to power releases and possibly other spill, not return water.

[3] On the 2d and 3d series for a short period preceding and during the time of measurements, R. V. Meikle, Chief Engineer Turlock Irrigation District, arranged for constant and continuous release through the La Grange power plant instead of the usual intermittent release. In spite of this, however, fluctuations were noticeable at some of the points of measurement. The results for these two series may therefore be somewhat vitiated due to inability to exactly time each measurement so as to follow downstream the same fluctuation. On the third series, particularly, fluctuations were such as to render the measurements at Hickman Bridge and ½ mile above Dry Creek of no value.

TABLE 138

TUOLUMNE RIVER RETURN WATER AND DIVERSIONS, 1928

(Acre-feet except as noted)

Location of measurements[1]	July		August		September		July to September, inclusive	
	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions
Tuolumne River at Roberts Ferry Bridge	2,830		[3]3,960		[3]27,900		[3]34,690	
G. H. Sawyer		26		12		9		47
R. L. Benson		0		0		1		1
Dry Creek at Modesto	2,936		2,945		2,985		8,866	
W. F. Duffie		71		67		63		201
Bancroft Fruit Farm		132		101		5		238
Bancroft Fruit Farm		98		97		1		196
Tuolumne River at Tuolumne City Bridge	19,000		[3]19,800		[3]42,400		[3]81,200	
Accretion—Roberts Ferry Bridge to Tuolumne City Bridge	[2]13,234		[2]12,895		[2]11,515		[3]37,644	
Total diversions		327		277		79		683
Total return flow—Roberts Ferry Bridge to Tuolumne City Bridge	[2]13,561		[2]13,172		[2]11,594		[3]38,327	
Total return flow (average second-feet)	[2]220		[2]214		[2]195		[2]210	

[1] Listed in downstream order.
[2] Exclusive of Dry Creek inflow.
[3] Includes water released from Don Pedro Reservoir through La Grange power plant as follows: (acre-feet) August, 11,40; September, 23,700; total, 24,840.

TABLE 139

DRY CREEK RETURN WATER MEASUREMENTS, 1924 TO 1927, INCLUSIVE

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
1924—									
Dry Creek near Paulsell	June 30, 1924		Dry	Aug. 4, 1924		Dry	Sept. 13, 1924		Dry
Dry Creek near Old Waterford bridge	June 30, 1924		3.3	Aug. 4, 1924		2.6	Sept. 13, 1924		2.2
Dry Creek 2 miles north and ½ mile east of Empire	June 30, 1924		12.1	Aug. 5, 1924		12.9	Sept. 13, 1924		11.8
Sturtevant pump	June 28, 1924	2.0		Aug. 5, 1924	0		Sept. 13, 1924	0	
Dry Creek near mouth	June 28, 1924		27	Aug. 5, 1924		31	Sept. 13, 1924		28
1925—									
Dry Creek near Old Waterford Bridge	July 30, 1925		5	Sept. 3, 1925		4	Oct. 5, 1925		7
Dry Creek 2 miles north and ½ mile east of Empire	July 30, 1925		15	Sept. 3, 1925		18	Oct. 5, 1925		22
Dry Creek near mouth	July 30, 1925		32	Sept. 3, 1925		40	Oct. 5, 1925		42
1926—									
Dry Creek near Old Waterford Bridge	July 19, 1926		3.4	Aug. 28, 1926		3.5			
Dry Creek, north of Empire	July 19, 1926		12.7	Aug. 28, 1926		13			
Sturtevant pump, 8 in.	July 19, 1926	0		Aug. 28, 1926	3.0		Sept. 28, 1926	0	
Dry Creek near mouth	July 19, 1926		32.2	Aug. 28, 1926		31			
1927—									
Dry Creek near Old Waterford Bridge	Aug. 5, 1927		5.6	Sept. 2, 1927		5.0	Oct. 8, 1927		5.6
Dry Creek north of Empire	Aug. 5, 1927		27.0	Sept. 2, 1927		33.0	Oct. 8, 1927		41.0
Sturtevant pump	Aug. 5, 1927	1.0		Sept. 2, 1927	0		Oct. 8, 1927	0	
Dry Creek near mouth	Aug. 5, 1927		59.0	Sept. 2, 1927		53.0	Oct. 8, 1927		78.0

*Measurements are listed in downstream order.

TABLE 140

DRY CREEK RETURN WATER AND DIVERSIONS, 1928

(Acre-feet except as noted)

Location of measurements*	July		August		September		July to September, inclusive	
	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions
Near Old Waterford Bridge	407		450		463		1,320	
J. S. Tully		7		0		0		7
Osborn		2		2		2		6
At Modesto Bridge	2,936		2,945		2,985		8,866	
Accretion—Old Waterford to Modesto Bridge	2,529		2,495		2,522		7,546	
Total diversions		9		2		2		13
Total return flow—Old Waterford to Modesto Bridge	2,538		2,497		2,524		7,559	
Total return flow (average second-feet)	41		41		42		41	

*Measurements are listed in downstream order.

TABLE 141

MERCED RIVER RETURN WATER MEASUREMENTS, 1924

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Merced River at Yosemite railroad crossing	July 1, 1924		2	Aug. 1, 1924		Dry	Sept. 10, 1924		Dry
Rusconi pump above Ryer Bridge, 7 in.	July 1, 1924	2.6		Aug. 1, 1924	0		Sept. 10, 1924	0	
Juniman pump, 8 in.	July 1, 1924	0		Aug. 1, 1924	0		Sept. 10, 1924	3.5	
Mehrton pump, 8 in.	July 1, 1924	0		Aug. 1, 1924	0		Sept. 10, 1924	3.5	
Schmidt pump, 10 in.	July 1, 1924	0		Aug. 1, 1924	0		Sept. 10, 1924	6.6	
Lovely pump, 4 in.	July 1, 1924	0		Aug. 1, 1924	0		Sept. 10, 1924	0 9	
Wells pump, 6 in.	July 1, 1924	0		Aug. 1, 1924	0		Sept. 10, 1924	2.0	
Merced River at Atchison, Topeka and Santa Fe Railroad	July 1, 1924		11	Aug. 1, 1924		12	Sept. 10, 1924		2.0
Delhi Colony pump	July 1, 1924	3 0		Aug. 1, 1924	3.0		Sept. 10, 1924	3 0	
Portuguese Ranch, 10 in. pump (Cabrall)	July 1, 1924	0		Aug. 1, 1924	6.6		Sept. 10, 1924	6.6	
Merced River on Woodward Ranch at Gage	July 1, 1924		32	Aug. 1, 1924		26	Sept. 10, 1924		26.0
T. C. Turner, 12 in. pump	July 1, 1924	8 0		Aug. 1, 1924	0		Sept. 10, 1924	0	
Old McCormack, 10 in. pump (At old Milliken Bridge)	July 1, 1924	6.6		Aug. 1, 1924	6.6		Sept. 10, 1924	6.6	
Milliken, 10 in. pump	July 1, 1924	0		Aug. 1, 1924	6.6		Sept. 10, 1924	6.6	
W. D. Adams, 12 in. pump	July 1, 1924	10.0		Aug. 1, 1924	10.0		Sept. 10, 1924	10 0	
Robert Adams, 10 in. pump	July 1, 1924	6.6		Aug. 1, 1924	6.6		Sept. 10, 1924	6.6	
McCullough, 10 in. pump	July 1, 1924	6.6		Aug. 1, 1924	6.6		Sept. 10, 1924	6.6	
Collier, 14 in. pump	July 1, 1924	13.3		Aug. 1, 1924	13.3		Sept. 10, 1924	13.3	
Stevinson, 15 in. pump	July 1, 1924	15.5		Aug. 1, 1924	15.5		Sept. 10, 1924	15.5	
Peck, 18 in. pump	July 1, 1924	22 0		Aug. 1, 1924	22 0		Sept. 10, 1924	0	
Merced River near mouth	July 1, 1921		21.4	Aug. 1, 1924		2	Sept. 10, 1924		15 0

* Measurements are listed in downstream order.

TABLE 142

MERCED RIVER RETURN WATER MEASUREMENTS, 1925

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Merced River at Yosemite railroad crossing	July 23, 1925		40	Aug. 29, 1925		5.5	Sept. 27, 1925		4
Campodonica (Juniman), pump 6 in.	July 23, 1925	2.0		Aug. 29, 1925	0		Sept. 28, 1925	0	
McCormick pump, 6 in.	July 23, 1925	0		Sept. 29, 1925	1.0		Sept. 27, 1925	0	
C. E. Drew pump, 10 in.	July 23, 1925	6.6		Aug. 28, 1925	0		Sept. 27, 1925	0	
Merced River at Atchison, Topeka and Santa Fe R. R. crossing	July 23, 1925		58	Aug. 28, 1925		38.0	Sept. 27, 1925		32
McLaughlin pump, 6 in.	July 23, 1925	0		Aug. 28, 1925	2.0		Sept. 27, 1925	0	
McCall pump, 10 in.	July 23, 1925	5.0		Aug. 28, 1925	0		Sept. 27, 1925	0	
Delhi Colony pump	July 23, 1925	3.0		Aug. 28, 1925	3.0		Sept. 27, 1925	3.0	
Portuguese Ranch pump, 10 in. (Cabrall)	July 23, 1925	6.6		Aug. 28, 1925	6.6		Sept. 27, 1925	0	
Winton pump, 6 in.	July 23, 1925	2.0		Aug. 28, 1925	2.0		Sept. 27, 1925	2.0	
Merced River at Woodward Ranch	July 24, 1925		118	Aug. 29, 1925		64.0	Sept. 29, 1925		61
McCormack pump, 10 in.	July 24, 1925	6.6		Aug. 29, 1925	0		Sept. 29, 1925	6.6	
Milliken pump, 10 in.	July 24, 1925	6.6		Aug. 29, 1925	6.6		Sept. 29, 1925	0	
W. D. Adams pump, 12 in.	July 24, 1925	0		Aug. 29, 1925	0		Sept. 29, 1925	10.0	
Robert Adams pump, 10 in.	July 24, 1925	6.6		Aug. 29, 1925	6.6		Sept. 29, 1925	0	
McCullough pump, 10 in.	July 24, 1925	6.6		Aug. 29, 1925	0		Sept. 29, 1925	0	
Stevinson pump, 15 in.	July 24, 1925	15.5		Aug. 29, 1925	15.5		Sept. 29, 1925	15.5	
Peck pump, 18 in.	July 24, 1925	22.2		Aug. 29, 1925	0		Sept. 29, 1925	0	
Merced River near mouth	July 24, 1925		131	Aug. 29, 1925		73.0	Sept. 29, 1925		91

* Measurements are listed in downstream order.

TABLE 143

MERCED RIVER RETURN WATER MEASUREMENTS, 1926

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Merced River at Yosemite railroad crossing	July 14, 1926		15	Aug. 23, 1926		5			
Rusconi pump, 7 in.	July 14, 1926	0		Aug. 23, 1926	1.3		Sept. 28, 1926	0	
McCormick pump, 6 in.	July 14, 1926	0		Aug. 23, 1926	1.0		Sept. 28, 1926	0	
Merced River at Atchison, Topeka and Santa Fe R. R. crossing	July 14, 1926	0	53	Aug. 23, 1926		31			
McLaughlin pump, 6 in.	July 14, 1926			Aug. 23, 1926	2.0		Sept. 28, 1926	0	
Delhi Colony pump, 8 in.	July 14, 1926	1.5		Aug. 23, 1926	3.0		Sept. 28, 1926	0	
Portuguese Ranch pump, (Cabrall) 6 in. and 12 in.	July 14, 1926	6.7		Aug. 23, 1926	6.0		Sept. 28, 1926	6.0	
Merced River at Woodward Ranch	July 15, 1926		81	Aug. 24, 1926		79			
Turner pump, 12 in. (Branco)	July 15, 1926	0		Aug. 24, 1926	10.0		Sept. 27, 1926	0	
McCormack pump, 10 in.	July 15, 1926	6.6		Aug. 24, 1926	6.6		Sept. 27,1 926	0	
Milliken pump, 10 in.	July 15, 1926	6.6		Aug. 24, 1926	6.6		Sept. 27, 1926	0	
W. D. Adams pump, 12 in.	July 15, 1926	10.0		Aug. 24, 1926	10.0		Sept. 27, 1926	10.0	
Robert Adams pump, 10 in.	July 15, 1926	6.6		Aug. 24, 1926	6.6		Sept. 27, 1926	6.6	
McCullough pump, 10 in.	July 15, 1926	6.6		Aug. 24, 1926	6.6		Sept. 27, 1926	0	
Collier pump, 14 in.	July 15, 1926	0		Aug. 24, 1926	13.0		Sept. 27, 1926	0	
Stevinson pump, 15 in.	July 15, 1926	15.0		Aug. 24, 1926	15.0		Sept. 27, 1926	15.0	
Merced River near mouth	July 15, 1926		90	Aug. 24, 1926		53	Sept. 29, 1926		73

* Measurements are listed in downstream order.

TABLE 144

MERCED RIVER RETURN WATER MEASUREMENTS, 1927

Location of measurements*	First series			Second series			Third series		
	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second	Date	Diversions, cubic feet per second	Measured flow, cubic feet per second
Merced River at Yosemite railroad crossing	July 31, 1927		37	Aug. 29, 1927		12	Oct. 3, 1927		[2]185
Rusconi pump	July 31, 1927	1.0		Aug. 29, 1927	1.0		Oct. 3, 1927	0	
Harter and Perrigo pumps	July 31, 1927	6.0		Aug. 29, 1927	1.0		Oct. 3, 1927	0	
Mehrton pump	July 31, 1927	1.0		Aug. 29, 1927	0		Oct. 3, 1927	0	
Schmidt pump (Kynaston)	July 31, 1927	6.0		Aug. 29, 1927	0		Oct. 3, 1927	0	
Lovely pump	July 31, 1927	0		Aug. 29, 1927	0.5		Oct. 3, 1927	0	
C. E. Drew pump	July 31, 1927	0		Aug. 29, 1927	3.0		Oct. 3, 1927	0	
Merced River at Atchison, Topeka and Santa Fe R. R. crossing	July 31, 1927		83	Aug. 29, 1927		55	Oct. 3, 1927		[2]377
Delhi Colony pump	July 31, 1927	3.0		Aug. 29, 1927	0		Oct. 3, 1927	0	
Portuguese Ranch pumps (Cabrall)	July 31, 1927	10.0		Aug. 29, 1927	10.0		Oct. 3, 1927	0	
Merced River at Woodward Ranch (4 miles below highway)	Aug. 1, 1927		180	Aug. 30, 1927		171	Oct. 4, 1927		[2]409
McCormack pump	Aug. 1, 1927	6.0		Aug. 30, 1927	0		Oct. 4, 1927	0	
Milliken pump	Aug. 1, 1927	0		Aug. 30, 1927	11.5		Oct. 4, 1927	6.0	
W. D. Adams pump	Aug. 1, 1927	10.0		Aug. 30, 1927	10.0		Oct. 4, 1927	10.0	
Robert Adams pump	Aug. 1, 1927	6.0		Aug. 30, 1927	6.0		Oct. 4, 1927	0	
McCullough pump	Aug. 1, 1927	6.0		Aug. 30, 1927	6.0		Oct. 4, 1927	0	
Collier pump	Aug. 1, 1927	0		Aug. 30, 1927	4.0		Oct. 4, 1927	0	
Merced River near mouth[1]	Aug. 1, 1927		233	Aug. 30, 1927		204	Oct. 4, 1927		[2]527

* Measurements are listed in downstream order.

[1] Below point of measurement there is a side connecting channel from Merced River joining San Joaquin River at a point upstream from the point where latter stream is measured (above mouth of Merced River). As the flow in this side channel is included in the San Joaquin River measurement it is deducted from the measurements on Merced River near mouth (as shown in this table) to get the discharge to San Joaquin River as given in Table 127.

[2] Includes 150 second-feet power release in excess of canal diversion—not return water. Variable excess release probably vitiates third series results.

TABLE 145

MERCED RIVER RETURN WATER AND DIVERSIONS, 1928

(Acre-feet except as noted)

Location of measurements*	July		August		September		July to September, inclusive	
	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions	Discharge	Diversions
At Yosemite Valley railroad crossing	1,208		1,805		1,390		4,403	
L. Rusconi		115		132		35		282
Harter and Perrigo		19		25		8		52
Harter and Perrigo		18		16		22		56
J. G. Strong		35		39		17		91
C. L. Mehrton		10		9		6		25
R. K. Kynaston		21		26		15		62
G. H. Lovely		4		13		9		26
Wells		3		7		8		18
McCormick		3		7		8		18
C. E. Drew		40		32		27		99
C. A. Laughlin		31		27		13		71
State Land Settlement (Delhi)		40		17		11		68
McConnell (Veiera and Santos)		6		0		6		12
Linehers Company		143		87		93		323
Wm. Collier (Cabrall)		120		133		69		322
Wm. Collier (Cabrall)		30		30		30		90
Scott Hughes		21		27		22		70
French American Corp. (J. Branco)		37		50		29		116
McCormack (Neves-Bettencourt)		215		217		163		595
H. F. Milliken		291		279		204		774
W. D. Adams		274		247		204		725
Robert Adams		194		188		163		545
McCullough		194		180		146		520
Mary Collier		46		29		15		90
Francis Hartman		71		28		33		132
Stevinson Corporation		16		16		7		39
J. F. Peck		23		16		0		39
Floyd Stevinson		37		19		0		56
J. J. Stevinson		1,394		1,131		980		3,505
At bridge on Hills Ferry Road	11,700		8,600		8,920		29,220	
Accretion—Yosemite Valley railroad crossing to bridge on Hills Ferry Road	10,492		6,795		7,530		24,817	
Total diversions		3,451		3,027		2,343		8,821
Total return flow—Yosemite Valley railroad crossing to bridge on Hills Ferry Road	13,943		9,822		9,873		33,638	
Total return flow (average second-feet)	227		160		166		184	

* Measurements are listed in downstream order.

TABLE 146

COMPARISON OF DIVERSIONS AND RETURN WATER, SAN JOAQUIN VALLEY, 1924

(Quantities in acre-feet)

	July	August	September	July to Sept., inclusive
DIVERSIONS				
San Joaquin River near Friant*[1]	20,600	16,200	12,700	49,500
Merced River near Merced Falls*[1]	4,340	1,880	860	7,080
Turlock Canal[1]	61,500	49,800	26,600	137,900
Modesto Canal[1]	34,500	26,600	6,960	68,060
Oakdale Canal[1]	1,590	1,480	1,820	4,890
South San Joaquin Canal[1]	4,810	4,360	5,440	14,610
San Joaquin River and tributaries, pumping diversions**	12,600	10,800	10,400	33,800
Total diversions	139,940	111,120	64,780	315,840
RETURN				
San Joaquin River near Vernalis[1]	25,800	25,800	24,800	76,400
San Joaquin River and tributaries, pumping diversions**	12,600	10,800	10,400	33,800
Total return	38,400	36,600	35,200	110,200
Return in per cent of diversions	27	33	54	35

*This flow all diverted within a short distance from the foothills.
**Return water diverted by pumping. Estimated from measurements for three series, Table 119.
[1] From records of Water Resources Branch, U. S. Geological Survey.

TABLE 147

COMPARISON OF DIVERSIONS AND RETURN WATER, SAN JOAQUIN VALLEY, 1925 AND 1926

(Quantities in acre-feet)

	1925			1926			
	August	September	August to September, inclusive	July	August	September	July to September, inclusive
DIVERSIONS							
San Joaquin River near Friant*[1]	65,800	37,100	102,900	58,800	39,300	34,900	133,000
Merced River near Merced Falls*[1] (At Exchequer for 1926)	13,300	4,390	17,690	72,600	38,200	2,010	112,810
Turlock Canal*	56,500	37,700	94,200	64,000	65,200	35,900	165,100
Modesto Canal*	36,400	28,600	65,000	45,700	39,400	23,100	108,200
Oakdale Canal*	5,200	4,110	9,310	3,570	2,370	2,110	8,050
South San Joaquin Canal*	13,900	11,200	25,100	11,400	9,530	8,150	29,080
San Joaquin River and tributaries, pumping diversions**	13,000	8,400	21,400	16,000	18,000	13,000	47,000
Total diversions	204,100	131,500	335,600	272,070	212,000	119,170	603,240
RETURN							
San Joaquin River near Vernalis*	50,400	[2]57,000	107,400	47,200	37,000	[2]36,800	121,000
San Joaquin River and tributaries, pumping diversions**	13,000	8,400	21,400	16,000	18,000	13,000	47,000
Total return	63,400	65,400	128,800	63,200	55,000	49,800	168,000
Return in per cent of diversions	31	50	38	23	26	42	28

*From records of Water Resources Branch, U. S. Geological Survey.
**Return water diverted by pumping. Estimated from measurements for three series, Tables 120 and 121.
[1] This flow is all diverted below the gaging station during the months shown in this table.
[2] 5,500 and 8,000 acre-feet for September, 1925 and 1926, respectively, have been subtracted from the U. S. G. S. records for this station to give the figures here shown. These allowances are the estimated amounts of water released by the Turlock Irrigation District from Don Pedro Reservoir for the La Grange power plant and should not, therefore, be included as return water.

TABLE 148

COMPARISON OF DIVERSIONS AND RETURN WATER, SAN JOAQUIN VALLEY, 1927

(Quantities in acre-feet)

	August	September	August to September, inclusive
DIVERSIONS			
San Joaquin River near Friant[1] [2] (Miller and Lux canals)	71,300	47,100	118,400
Merced River at Exchequer[1] [2] (Merced Irrigation District Canal)	83,600	[3]66,900	150,500
Turlock Canal[1]	46,700	36,100	82,800
Modesto Canal[1]	38,500	34,100	72,600
Stanislaus River near Knights Ferry[1] [2] (Oakdale and South San Joaquin canals)	[4]55,800	46,200	102,000
San Joaquin River and tributaries, pumping diversions[5]	16,000	11,000	27,000
Total diversions	311,900	241,400	553,300
RETURN			
San Joaquin River near Vernalis[1]	[6]77,100	[6]75,900	153,000
San Joaquin River and tributaries, pumping diversions[5]	16,000	11,000	27,000
Total return	93,100	86,900	180 000
Return in per cent of diversions	30	36	32

[1] U. S. G. S. Station.

[2] This flow is all diverted below the gaging station during the months shown, except as noted.

[3] Recorded flow of 70,800 has been reduced by 3,900 acre-feet which is the estimated amount of power water released from Lake McClure in excess of canal diversions, from September 21st to 30th. (See note, Table 144.)

[4] Recorded flow of 56,900 has been reduced by 1,100 acre-feet which is the estimated amount of power water released from Melones Reservoir in excess of canal diversions, from August 1st to 11th. (See note, Table 132.)

[5] Return water diverted by pumping. Estimated from measurements for three series, Table 122.

[6] 9,000 and 14,500 acre-feet for August and September, respectively, have been subtracted from the recorded flow for this station to give the figures here shown. These allowances are the estimated amounts of power releases which should not be included as return water, as follows: August, Stanislaus (Melones) 1,100; Tuolumne (Don Pedro) 7,900; September, Tuolumne 10,600; Merced (Lake McClure) 3,900.

TABLE 149

COMPARISON OF DIVERSIONS AND RETURN WATER, SAN JOAQUIN VALLEY, 1928

(Quantities in acre-feet except as noted)

	July	August	September	July to September, inclusive
DIVERSIONS				
San Joaquin River near Friant (Miller and Lux canals)[1] [2]	61,400	58,300	52,200	171,900
Merced River at Exchequer (Merced Irrigation District Canal)[1] [2]	90,400	77,500	56,500	224,400
Turlock Irrigation District Canal[1]	57,600	58,200	46,700	162,500
Modesto Irrigation District Canal[1]	27,900	35,000	19,700	82,600
Stanislaus River near Knights Ferry[1] [2] (Oakdale and South San Joaquin Irrigation District canals)	60,100	38,400	27,800	126,300
Pumping diversions—San Joaquin, Stanislaus, Tuolumne, Merced rivers and Dry Creek[3]	16,900	15,200	12,400	44,500
Total diversions	314,300	282,600	215,300	812,200
Total diversions (average second-feet)	5,120	4,590	3,620	4,440
RETURN				
San Joaquin River near Vernalis[1]	69,500	[4]55,400	[4]55,400	180,300
Pumping diversions—San Joaquin, Stanislaus, Tuolumne, Merced rivers and Dry Creek[3]	16,900	15,200	12,400	44,500
Total return	86,400	70,600	67,800	224,800
Total return (average second-feet)	1,400	1,150	1,140	1,230
Return in per cent of diversions	27	25	32	28

[1] U. S. G. S. Station.
[2] This flow all diverted below the gaging station after July 1st.
[3] From Table 123. This is return water diverted by pumping.
[4] Excludes from recorded flow 1,140 acre-feet in August and 23,700 in September which was water released to Tuolumne River from Don Pedro Reservoir through La Grange power plant and hence not return water.

TABLE 150

WATER DISCHARGED TO THE SACRAMENTO RIVER ABOVE SACRAMENTO AS MEASURED AT DEFINITE RETURN CHANNELS, 1924 TO 1928, INCLUSIVE

From records for Butte Slough, District 70 Drain, District 108 Drain, Colusa Basin Drainage at Knights Landing, Sacramento Slough, District 1000 Drain (Pritchard Lake), Conaway Drainage, District 1000 Drain (2d Bannon Slough) and Back Borrow Pit of District 1000.

(See Tables 173 to 208, inclusive)

Month	Acre-feet	Average second-feet
1924—		
May	17,730	288
June	27,340	459
July	31,490	512
August	40,760	662
September	35,740	600
October	24,200	393
Total	177,260	486
1925—		
June[1]	76,591	1,290
July	67,604	1,120
August	59,848	990
September	91,542	1,540
October	40,929	678
Total	336,514	1,101
1926—		
May[2]	82,300	1,340
June	82,000	1,380
July	74,200	1,210
August	93,500	1,520
September	97,100	1,630
October	39,800	647
Total	468,900	1,280
1927—		
June[3]	113,400	1,910
July	93,700	1,520
August	106,200	1,730
September	105,100	1,770
October	55,500	903
Total	473,900	1,560
1928—		
June	[4]88,300	[4]1,480
July	86,100	1,400
August	91,900	1,490
September	85,200	1,430
October	28,400	462
Total	379,900	1,250

[1] Considerable portion of June inflow derived from natural run-off.

[2] The May record for Butte Slough used in this total is for 28 days only. Also portions of the May records for other stations are estimated.

[3] The discharge for June includes some natural run-off. Particularly Butte and Sacramento sloughs. (June flow of Butte Creek near Eastside Highway was 4,980 acre-feet. See Table 37.)

[4] Includes 782 acre-feet or 13 second-feet natural flow in Butte Creek as measured near Eastside Highway. See Table 38.

TABLE 151

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1924, USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE MEASURED CHANNELS*

	June		July		August		September		June to September, inclusive	
	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second
Return										
Reclamation District 70, drain	1,160	20	1,180	19	1,240	20	980	16	4,560	19
Reclamation District 108, drain	7,280	122	6,450	105	8,700	141	1,550	26	23,980	99
Colusa Basin drainage at Knights Landing	16,700	280	15,900	258	17,500	285	17,300	291	67,400	278
Sacramento Slough (less flow down east borrow pit of Sutter by-pass)	933	16	7,790	126	11,200	182	9,800	164	29,723	123
Total return	26,073	438	31,320	508	38,640	628	29,630	497	125,663	519
Total diversions, Red Bluff to Sacramento	170,100	2,860	170,400	2,770	145,600	2,370	80,700	1,355	566,800	2,340
Return in per cent of diversions	15%		18%		27%		37%		22%	

* As distinguished from use of all accretions as indicated in Table 152.

TABLE 152

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1924, INCLUDING ALL ACCRETIONS*

River section	June		July		August		September		Totals		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	
Return													
Red Bluff-Butte City	12,100	203	10,800	176	4,650	76	3,630	62	31,180	129	31,180	129	11%
Butte City-Colusa	8,560	144	7,410	121	5,130	83	5,190	87	26,290	109	57,470	238	18%
Colusa-Knights Landing	32,000	537	18,900	307	27,300	444	17,700	297	95,900	396	153,370	634	31%
Knights Landing-Sacramento	753	13	8,020	130	11,200	182	11,200	188	31,173	129	184,543	763	33%
Totals	53,413	897	45,130	734	48,280	785	37,720	634	184,543	763			
Return in per cent of draft, Red Bluff to Sacramento	31%		26%		33%		47%		33%				

* As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the intervening diversions, the results must of necessity include both those accretions entering from definite return channels which have been measured, and accretions due to seepage, groundwater return, etc., which can not be directly measured.

NOTE—In Tables 151 and 152, in order to show return water from Sacramento River irrigation only, the discharge to the river of the Feather and American rivers is excluded, as is also return through Butte Slough and a portion of the return through Sacramento Slough derived from Feather River diversions.

TABLE 153

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JULY TO OCTOBER, 1925, USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE MEASURED CHANNELS *

	July		August		September		October		July to October, inclusive	
	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second
Return										
Reclamation District 70, drain	3,070	50	3,380	55	944	16	905	15	8,299	34
Reclamation District 108, drain	2,650	43	2,580	42	721	12	509	8	6,460	26
Colusa Basin Drainage at Knights Landing	24,100	392	26,900	439	51,100	860	15,600	254	117,700	482
Sacramento Slough (Less flow down east borrow pit-Sutter by-pass)	17,200	280	16,200	263	15,500	260	3,930	64	52,830	217
Conaway Drainage					776	13	687	11	1,463	6
Reclamation District 1000, drain	776	13	948	15	2,720	46	2,600	42	7,044	29
Total return	47,796	778	50,008	799	71,761	1,207	24,231	394	193,796	794
Total diversions, Red Bluff to Sacramento	188,400	3,070	171,600	2,790	113,600	1,910	13,560	221	487,160	2,000
Return in per cent of diversions	25%		29%		63%		180%		40%	

* As distinguished from use of all accretions as indicated in Table 154.

TABLE 154

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JULY TO OCTOBER, 1925, INCLUDING ALL ACCRETIONS *

River section	July		August		September		October		Totals		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Avearge cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	
Return													
Red Bluff-Butte City	29,000	473	14,500	236	6,450	109	3,100	51	53,050	218	53,050	218	21%
Butte City-Colusa	7,900	129	6,900	112	4,660	78	—2,010	—33	17,450	72	70,500	290	23%
Colusa-Knights Landing	44,700	728	42,640	693	47,800	805	20,040	326	155,180	637	225,680	924	52%
Knights Landing-Sacramento	18,000	294	17,100	279	19,000	318	7,200	117	61,300	252	286,980	1,179	59%
Totals	99,600	1,624	81,140	1,320	77,910	1,310	28,330	460	286,980	1,179			
Return in per cent of draft Red Bluff to Sacramento	53%		47%		69%		209%		59%				

* As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the interveing diversions, the results must of necessity include both those accretions entering from definite return channels which have been measured and accretions due to seepage, ground water return, etc., which can not be directly measured.

NOTE—In Tables 153 and 154, in order to show return water from Sacramento River irrigation only, the discharge to the Sacramento River of the Feather and American rivers is excluded, as is also return through Butte Slough and a portion of the return through Sacramento Slough derived from Feather River diversions. Also, in Table 154, the natural inflow from Mill, Antelope, Deer and other creeks between Red Bluff and Butte City has been excluded. The return for the month of June is not given as the return channels were carrying considerable natural run-off during that month.

TABLE 155

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1926, USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE MEASURED CHANNELS *

	June		July		August		September		June to September, inclusive	
	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second
Return										
Reclamation District 70, drain	729	12	1,080	18	499	8	194	3	2,502	10
Reclamation District 108, drain	4,610	78	5,490	89	6,490	106	5,780	97	22,370	93
Colusa Basin drainage at Knights Landing	32,400	545	28,900	471	42,500	692	38,200	643	142,000	588
Sacramento Slough (Less flow down east borrow pit of Sutter By-pass)	19,660	331	17,560	286	17,320	282	12,690	214	67,230	277
Reclamation District 1000, drain (Pritchard Lake)							416	7	416	2
Conaway drainage							495	8	495	2
Reclamation District 1000, drain (2d Bannon Slough)	1,750	29	1,140	19	1,170	19	1,620	27	5,680	24
Total return	59,149	995	54,170	883	67,979	1,107	59,395	999	240,693	996
Total diversions, Red Bluff to Sacramento	238,400	4,020	237,100	3,860	208,300	3,400	82,800	1,390	766,600	3,170
Return in per cent of diversions	25%		23%		32%		72%		31%	

* As distinguished from use of all accretions as indicated in Table 156.

TABLE 156

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1926, INCLUDING ALL ACCRETIONS*

River section	June		July		August		September		Totals June to September, inclusive		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	
Return													
Red Bluff-Butte City	39,900	670	27,000	439	6,180	101	8,220	138	81,300	336	81,300	336	21%
Butte City-Colusa	12,500	210	12,500	203	8,400	137	—2,070	—35	31,330	130	112,630	466	23%
Colusa-Knights Landing	57,800	971	46,200	750	50,100	814	34,900	586	18,900	782	301,630	1,248	45%
Knights Landing-Verona	23,800	400	10,000	162	10,400	169	20,600	346	64,800	268	366,430	1,516	53%
Verona-Sacramento	1,750	29	1,140	19	1,170	19	2,530	42	6,590	27	373,020	1,543	49%
Totals	135,750	2,280	96,840	1,573	76,250	1,240	64,180	1,077	373,020	1,543			
Return in per cent of draft, Red Bluff to Sacramento	57%		41%		36%		78%		49%				

* As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the intervening diversions, the results must of necessity include both those accretions entering from definite return channels which have been measured and accretions due to seepage, ground water return, etc., which can not be directly measured.

NOTE—In Tables 155 and 156, in order to shown return water from Sacramento River irrigation only, the discharge to the Sacramento River of the Feather and American rivers is excluded, as is also return through Butte Slough, a portion of the return through Sacramento Slough derived from Feather River diversions and the return through the back borrow pit of Reclamation District 1000. Also, in Table 156, the inflow from Mill, Antelope, Deer and other creeks between Red Bluff and Butte City has been excluded.

TABLE 157

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1927, USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE MEASURED CHANNELS*

	June		July		August		September		June to September, inclusive	
	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second
Return										
Reclamation District 70, drain	1,280	22	1,710	28	1,140	18	530	9	4,660	19
Reclamation District 108, drain	8,180	138	10,100	164	13,400	218	11,300	190	42,980	178
Colusa Basin Drainage at Knights Landing	42,100	708	37,200	605	43,300	705	39,400	663	162,000	670
Sacramento Slough (Less flow down east borrow pit of Sutter By-Pass)	22,500	378	20,200	328	23,200	378	22,100	372	88,000	364
Conaway Drainage							381	6	381	2
Reclamation District 1000, drain (2d Bannon Slough)	1,570	26	1,420	23	1,380	22	2,650	45	7,020	29
Reclamation District 1600, drain[1]	960	16	1,260	21	1,550	25	2,100	35	5,870	24
Total return	76,590	1,288	71,890	1,169	83,970	1,366	78,461	1,320	310,911	1,286
Total diversions, Red Bluff to Sacramento	216,500	3,640	239,600	3,900	222,400	3,620	121,400	2,040	799,900	3,310
Return in per cent of diversions	35%		30%		38%		65%		39%	

*As distinguished from use of all accretions as indicated in Table 158.

[1] This water returns to the river below Sacramento but is derived from irrigation draft in a section between Sacramento and Knights Landing. (See Table 209.)

TABLE 158

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1927, INCLUDING ALL ACCRETIONS*

River section	June[1]		July		August		September		Totals June to September, inclusive		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	Acre-feet	Average cubic feet per second	
Return													
Red Bluff-Butte City	32,000	538	38,700	630	22,300	363	8,290	139	101,290	418	101,290	418	28%
Butte City-Colusa	14,000	236	4,910	80			—5,110	—86	13,800	57	115,090	475	26%
Colusa-Knights Landing	55,800	940	65,100	1,060	68,400	1,112	58,700	988	248,000	1,025	363,090	1,500	51%
Knights Landing-Verona	80,200	1,348	20,700	337	29,400	478	22,400	376	152,700	631	515,790	2,131	70%
Verona-Sacramento	2,530	42	2,680	44	2,930	48	5,130	86	13,270	55	529,060	2,186	66%
Totals	184,530	3,104	132,090	2,151	123,030	2,001	89,410	1,503	529,060	2,186			
Return in per cent of draft—Red Bluff to Sacramento	[1]85%		55%		55%		74%		66%				

*As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the intervening diversions, the results must of necessity include both those accretions entering from definite return channels which have been measured and accretions due to seepage, ground water return, etc., which can not be directly measured.

[1] In June there was probably a considerable natural run-off, drainage from winter and spring ground water storage, etc., which would account for the high percentage of return obtained for that month in this table. (Compare with June return, Table 157.) Table 158-A (following) which is made up for July to Sept., inclusive, should, therefore, indicate more correctly, the draft-return water relation.

NOTE—In Tables, 157, 158 and 158A, in order to show return water from Sacramento River irrigation only, the discharge to the Sacramento River of the Feather and American rivers is excluded, as is also return through Butte Slough, a portion of the return through Sacramento Slough derived from Feather River diversions and the return through the back borrow pit of Reclamation District 1000. Also, in Table 158, the inflow from Mill, Antelope, Deer and other creeks between Red Bluff and Butte City has been excluded.

*TABLE 158-A

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JULY TO SEPTEMBER, 1927, INCLUDING ALL ACCRETIONS

River section	July		August		September		Totals, July to September, inclusive		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	
Return											
Red Bluff-Butte City	38,700	630	22,300	363	8,290	139	69,290	380	69,290	380	26%
Butte City-Colusa	4,910	80			—5,110	—86	—200	—1	69,090	379	22%
Colusa-Knights Landing	65,100	1,060	68,400	1,112	58,700	988	192,200	1,056	261,290	1,435	50%
Knights Landing-Verona	20,700	337	29,400	478	22,400	376	72,500	398	333,790	1,833	63%
Verona-Sacramento	2,680	44	2,930	48	5,130	86	10,740	59	344,530	1,892	59%
Totals	132,090	2,151	123,030	2,001	89,410	1,503	344,530	1,892			
Return in per cent of draft—Red Bluff to Sacramento	55%		55%		74%		59%				

*Same as Table 158 except that June figures are eliminated because there was apparently considerable natural run-off, ground water storage return, etc., in that month. (See notes, Table 158.)

TABLE 159

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1928, USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE MEASURED CHANNELS*

	June		July		August		September		June to September, inclusive	
	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second	Acre-feet	Cubic-feet per second
Return										
Reclamation District 70 Drain	965	16	1,310	21	1,320	21	1,060	18	4,655	19
Reclamation District 108 Drain	8,000	134	8,560	139	9,240	150	5,300	89	31,100	129
Colusa Basin Drainage at Knights Landing	30,200	507	27,700	451	29,600	481	30,000	505	117,500	485
Sacramento Slough* (Less flow down east borrow pit of Sutter By-Pass)	19,700	332	23,300	379	27,100	441	20,300	341	90,400	374
Reclamation District 1000 Drain (2d Bannon Slough)	1,290	22	1,580	26	2,070	34	3,080	52	8,020	33
Total return	60,155	1,011	62,450	1,016	69,330	1,127	59,740	1,005	251,675	1,040
Total diversions—Red Bluff to Sacramento	208,800	3,513	205,200	3,337	192,900	3,137	71,600	1,205	678,500	2,804
Return in per cent of diversions	29%		30%		36%		84%		37%	

*As distinguished from use of all accretions as indicated in Table 160.

TABLE 160

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JUNE TO SEPTEMBER, 1928, INCLUDING ALL ACCRETIONS*

River section	June		July		August		September		Totals June to September, inclusive		Total, Red Bluff to lower end of section		Return Red Bluff to lower end of section in per cent of draft in same stretch of river
	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	Acre-feet	Average cubic-feet per second	
Return													
Red Bluff-Butte City	31,100	523	15,400	250	7,110	116	—8,230	—139	45,380	188	45,380	188	14%
Butte City-Colusa	8,870	149	3,880	63	1,880	31	1,200	20	15,830	65	61,210	253	17%
Colusa-Knights Landing	59,100	994	54,500	886	49,000	796	36,100	607	198,700	821	259,910	1,074	45%
Knights Landing-Verona	19,300	325	13,000	211	22,000	358	13,200	222	67,500	279	327,410	1,353	54%
Verona-Sacramento	1,290	22	1,580	26	2,070	33	3,080	52	8,020	33	335,430	1,386	49%
Totals	119,660	2,013	88,360	1,436	82,060	1,334	45,350	762	335,430	1,386			
Return in per cent of draft—Red Bluff to Sacramento	57%		43%		43%		63%		49%				

*As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the intervening diversions, the results must of necessity include both those accretions entering from definite return channels which have been measured and accretions due to seepage, groundwater return, etc., which can not be directly measured.

NOTE—In Tables 159 and 160, in order to show return water from Sacramento River irrigation only, the discharge to the river of the Feather and American rivers is excluded, as is also return through Butte Slough, a portion of the return through Sacramento Slough derived from Feather River diversions and the return through the back borrow pit of Reclamation District 1000. Also, in Table 160, the inflow from Mill, Antelope, Deer and other creeks between Red Bluff and Butte City has been excluded.

TABLE 161

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER IS DERIVED, 1924

	June		July		August		September		October		June to October, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
Diversions														
Glenn-Colusa and Jacinto Irrigation Districts	54,000	907	53,500	870	43,300	704	25,600	430	5,200	84	181,600	598	17,594	25,302
Provident Irrigation District	19,600	329	20,200	328	18,200	296	10,700	180	784	13	69,484	229	7,031	3,925
Princeton-Codora-Glenn Irrigation District	7,220	121	7,780	127	5,650	92	3,940	66	846	14	25,436	84	864	3,785
Compton-Delevan Irrigation District—River	277	5	310	5	400	6	157	3	6	0	1,150	4	4,000	100
Compton-Delevan Irrigation District—Trough	6,590	111	6,020	98	5,090	83	2,510	42	0	0	20,210	66		
Maxwell Irrigation District—River	2,970	50	1,910	31	1,470	24	1,770	30	1,270	21	9,390	31	1,466	1,820
Maxwell Irrigation District—Trough**	1,050	18	1,280	21	1,620	26	655	11	803	13	5,408	18		
Total diversions	91,707	1,541	91,000	1,480	75,730	1,231	45,332	762	8,909	145	312,678	1,030	30,955	34,932
Return														
Colusa Trough measured at Colusa-Williams Highway	*17,900	300	12,600	205	14,200	231	14,600	245	7,580	123	66,880	220		
Trough diversions	7,640	128	7,300	119	6,710	109	3,165	53	803	13	25,618	84		
Total return	25,540	428	19,900	324	20,910	340	17,765	298	8,383	136	92,498	304		
Return in per cent of diversions	28%		22%		28%		39%		94%		30%			

*This includes the flow for the first twelve days of June, before gage was established, which has been estimated on a basis of the mean flow of 300 second-feet as measured for June 13 to 30.
**Includes diversions by pumps used for gun clubs.

TABLE 162

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER IS DERIVED, 1925

	June		July		August		September		October		June to October, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
Diversions														
Glenn-Colusa, Jacinto and Compton-Delevan Irrigation districts	53,543	904	63,480	1,036	62,090	1,012	37,741	636	2,834	46	219,688	724	20,805	11,133
Provident Irrigation District	20,188	338	21,273	347	19,430	317	16,184	273	2,037	33	79,112	262	8,160	380
Princeton-Codora-Glenn Irrigation District	8,732	147	9,143	149	9,354	153	6,492	109	926	15	34,647	114	1,761	3,086
Compton-Delevan Irrigation District—River	2,770	46	3,665	60	1,243	20	523	9	403	7	8,604	28	2,500	110
Compton-Delevan Irrigation District—Trough	309	5	14		406	7	214	4			943	3		
Maxwell Irrigation District—River	1,220	20	4,181	68	809	13	1,215	20			7,425	24	1,500	60
Maxwell Irrigation District—Trough*	1,342	23	1,640	27	2,852	46	2,401	40	1,246	20	9,481	31	Gun	clubs
A. D. J. Land Company—Trough					127	2	66	1	99	2	292	1	Gun	club
I. G. Zumwalt—Trough	2,428	41	3,274	53	1,879	31	375	6	136	2	8,092	27	4,600	
Total diversions	90,532	1,524	106,670	1,740	98,190	1,601	65,211	1,098	7,681	125	368,284	1,214	39,326	14,769
Return														
Colusa Trough measured at Colusa-Williams Highway	26,600	447	22,600	369	23,400	380	36,400	612	13,600	221	122,600	404		
Trough diversions	4,079	69	4,928	80	5,264	86	3,056	51	1,481	24	18,808	62		
Total return	30,679	516	27,528	449	28,664	466	39,456	663	15,081	245	141,408	466		
Return in per cent of diversions	34%		26%		29%		61%		196%		38%			

*Includes diversions by pumps used for gun clubs.

TABLE 163

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER IS DERIVED, 1926

	June		July		August		September		June to September, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
Diversions												
Glenn-Colusa, Jacinto and Compton-Delevan Irrigation districts	87,461	1,470	85,577	1,391	76,612	1,248	36,625	616	286,275	1,184	37,757	11,137
Provident Irrigation District	25,134	422	22,611	368	18,674	304	7,889	133	74,308	307	8,792	66
Princeton-Codora-Glenn Irrigation District	10,617	178	10,566	172	8,555	139	3,563	60	33,301	138	2,694	2,698
Compton-Delevan Irrigation District	771	13	801	13	790	13			1,362	10		683
Maxwell Irrigation District—River	2,664	45	1,729	28	1,130	18	576	10	6,099	25		
Maxwell Irrigation District—Trough*	1,820	31	3,120	51	2,542	41	3,252	55	10,734	44	1,609	10
Total diversions	128,467	2,159	124,404	2,023	108,303	1,763	51,905	874	413,079	1,708	50,852	14,594
Return												
Colusa Trough Measured at Colusa	31,800	535	25,000	407	42,100	685	28,400	477	127,300	527		
Williams Highway Trough Diversions	1,820	31	3,120	51	2,542	41	3,252	55	10,734	44		
Total return	33,620	566	28,120	458	44,642	726	31,652	532	138,034	571		
Return in per cent of diversions	26%		23%		41%		61%		33%			

*Includes diversions by pumps used for gun clubs.

TABLE 164

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER IS DERIVED, 1927

	June		July		August		September		June to September, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
Diversions												
Glenn-Colusa, Jacinto and Compton-Delevan Irrigation districts	72,686	1,222	79,430	1,292	75,733	1,231	38,667	650	266,516	1,101	28,187	15,919
Provident Irrigation District	21,491	361	21,449	349	19,467	317	8,152	137	70,559	291	8,035	95
Princeton-Codora-Glenn Irrigation District	9,750	164	11,021	179	10,093	164	4,341	73	35,205	145	3,311	2,648
E. M. Gordon	1,140	19	958	16	927	15	767	13	3,792	16	480	----------
Maxwell Irrigation District—River	1,665	28	1,606	26	1,315	21	1,124	19	5,710	24	862	10
Henry Jameson and John Rosenfelds Sons (Anthony and Garnett)—Trough	616	10	570	9	589	10	431	7	2,206	9	260	----------
Helphenstine and Rush (Whiting)—Trough	510	9	496	8	496	8	360	6	1,862	8	290	----------
Maxwell Irrigation District—Trough	----------	----------	84	1	2,349	38	3,985	67	6,418	27	----------	*5,208
A. D. J. Land Company—Trough	----------	----------	68	1	107	2	108	2	283	1	Gun	club
Total diversions	107,858	1,813	115,682	1,881	111,076	1,806	57,935	974	392,551	1,622	41,425	23,880
Return												
Colusa Trough measured at Colusa-Williams Highway	41,300	693	32,500	528	39,500	642	29,800	500	143,100	592		
Trough diversions	1,126	19	1,218	20	3,541	58	4,884	82	10,769	44		
Total return	42,426	712	33,718	548	43,041	700	34,684	582	153,869	636		
Return in per cent of diversions	39%		29%		39%		60%		39%			

*Gun clubs.

TABLE 165

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER IS DERIVED, 1928

	June		July		August		September		June to September, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
Diversions												
Glenn-Colusa, Jacinto, Provident and Compton-Delevan Irrigation districts	70,179	1,181	69,841	1,136	68,384	1,112	30,872	519	239,276	989	20,713	18,056
Provident Irrigation District	14,764	248	15,121	246	14,858	242	5,739	97	50,482	209	7,998	462
Princeton-Codora-Glenn Irrigation District	9,388	158	9,778	159	8,125	132	3,463	58	30,754	127	2,597	2,763
American Trust Company	636	11	372	6	418	7	295	5	1,721	7	[1]160	355
Maxwell Irrigation District (River plant)	2,399	40	2,725	44	2,461	40	581	10	8,166	34	1,050	10
Henry Jameson—Trough	598	10	652	11	598	10	126	2	1,974	8	200	----------
American Trust Company (C. J. Whiting)—Trough	154	3	0	0	0	0	0	0	154	1	([2])	----------
Maxwell Irrigation District—Trough	1,710	29	1,840	30	2,225	36	2,830	48	8,605	35	1,154	[3]3,640
Pete Larie—Trough	0	0	0	0	0	0	78	1	78	----------	----------	[3]100
Total diversions	99,828	1,680	100,329	1,632	97,069	1,579	43,984	740	341,210	1,410	33,872	25,386
Return												
Colusa Trough measured at Colusa-Williams Highway	32,000	537	29,800	485	32,400	526	27,000	454	121,200	501		
Trough diversions	2,462	41	2,492	41	2,823	46	3,034	51	10,811	45		
Total return	34,462	578	32,292	526	35,223	572	30,034	505	132,011	546		
Return in per cent of diversions	35%		32%		36%		68%		39%			

[1] Irrigated from both river and trough plants.
[2] See river plant.
[3] Gun clubs.

TABLE 166

RELATION BETWEEN RETURN WATER AND DIVERSIONS, RECLAMATION DISTRICT 108, 1924 TO 1928

	June		July		August		September		June to September, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
1924—												
Diversions*	18,372	309	18,314	298	14,053	229	2,679	45	53,418	221	10,315	4,466
Return water**	7,280	122	6,450	105	8,700	141	1,550	26	23,980	99		
Return in per cent of diversions	40 %		35 %		62 %		58 %		45 %			
1925—												
Diversions*	4,900	82	6,432	105	5,698	93	3,465	58	20,495	168	1,994	1,981
Return water**	1,570	26	2,650	43	2,580	42	721	12	7,521	62		
Return in per cent of diversions	32 %		41 %		45 %		21 %		37 %			
1926—												
Diversions*	16,181	272	15,666	255	15,026	244	5,690	95	52,563	217	6,363	865
Return water**	4,610	78	5,490	89	6,490	106	5,780	97	22,370	92		
Return in per cent of diversions	28 %		35 %		43 %		102 %		42 %			
1927—												
Diversions*	20,502	345	24,538	399	22,631	368	16,374	276	84,045	347	8,537	884
Return water**	8,180	138	10,100	164	13,400	218	11,300	190	42,980	178		
Return in per cent of diversions	40 %		41 %		59 %		69 %		51 %			
1928—												
Diversions*	14,989	252	14,569	237	14,657	238	1,466	25	45,681	189	5,890	1,244
Return water**	8,000	135	8,560	139	9,240	150	5,300	89	31,100	129		
Return in per cent of diversions	54 %		59 %		63 %		361 %		68 %			

*The diversions comprise all those from Sacramento River, right bank, from Mile 43.1 to Mile 63.2. The principal ones are the plants of R. D. 108 at Wilkins Slough, Eldorado (R. D. 2047 plant), Steiner Bend, Tyndall Mound and Boyer Bend.

**The return water is the discharge to the Sacramento River of District 108 drain at Rough and Ready Bend.

TABLE 167

RELATION BETWEEN RETURN WATER AND DIVERSIONS, RECLAMATION DISTRICT 1500, 1924 TO 1928

	June		July		August		September		June to September, inc.		Acreage irrigated	
	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Acre-feet	Cubic feet per second	Rice	General
1924—												
Diversions*	23,995	404	24,833	404	24,659	401	13,799	232	87,286	361	6,832	11,340
Return water**	482	8	5,572	91	9,243	150	8,440	142	23,737	98		
Return in per cent of diversions	2 %		22 %		37 %		61 %		27 %			
1925—												
Diversions*	37,475	630	33,770	549	29,717	483	21,162	356	122,124	505	7,162	15,050
Return water**	13,336	224	14,844	241	14,777	240	13,851	233	56,808	235		
Return in per cent of diversions	36 %		44 %		50 %		65 %		47 %			
1926—												
Diversions*	33,174	558	32,661	531	28,831	469	8,125	137	102,791	425	8,357	11,218
Return water**	18,600	313	16,600	270	16,200	263	11,100	187	62,500	258		
Return in per cent of diversions	56 %		51 %		56 %		137 %		61 %			
1927—												
Diversions*	39,556	666	40,857	664	39,253	638	22,253	374	141,919	586	12,387	12,314
Return water**	18,474	311	17,850	290	20,513	334	19,355	326	76,192	315		
Return in per cent of diversions	47 %		44 %		52 %		87 %		54 %			
1928—												
Diversions*	40,575	683	39,895	649	36,984	601	10,350	174	127,804	528	9,549	16,026
Return water**	14,799	249	18,246	297	21,753	354	14,708	247	69,506	287		
Return in per cent of diversions	36 %		46 %		59 %		142 %		54 %			

*The diversions comprise all those from the Sacramento River, left bank, from Mile 29.9 to Mile 63.75. The principal ones are Sutter Mutual Water Company plants at Tisdale, State Ranch Bend and Portuguese Bend.

**The return water is the discharge through the drainage plant of Reclamation District 1500 on the west borrow pit of Sutter By-pass. This water reaches Sacramento River via the west borrow pit and Sacramento Slough.

TABLE 168

DISCHARGE OF COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY, 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1			218	165	255	116
2			212	185	292	116
3			188	235	298	111
4			153	225	307	94
5			162	238	307	94
6			192	256	308	212
7			205	256	278	320
8			231	215	278	278
9			192	181	261	220
10			178	162	251	186
11			245	178	285	102
12			212	185	271	178
13		*295	148	188	235	111
14		315	178	188	231	51
15		346	178	193	251	77
16		339	195	215	288	102
17		363	178	212	288	148
18		406	162	215	288	77
19		317	195	238	278	131
20		322	261	278	228	138
21		310	128	305	236	94
22		300	295	309	245	77
23		290	245	305	278	128
24		278	235	292	271	111
25		268	235	288	261	77
26		255	228	261	205	60
27		247	228	258	111	60
28		251	225	255	77	77
29		251	222	235	84	94
30		238	215	242	94	94
31			248	212		89
Mean		[1]300	206	231	245	124
Acre-feet for month		[1]10,700	12,600	14,200	14,600	7,580

* Gage established June 13.

[1] 18 days.

NOTE—This is return water flowing in the main drain of Reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation districts.

TABLE 169

DISCHARGE OF COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY, 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	110	374	479	324	479	463
2	109	401	491	302	570	523
3	107	465	474	294	540	510
4	121	518	516	301	538	491
5	120	573	566	333	586	410
6	134	540	580	325	658	350
7	151	510	536	325	699	324
8	162	498	481	320	756	333
9	138	456	442	338	764	309
10	126	364	388	338	756	270
11	138	378	348	426	720	274
12	158	354	268	424	668	252
13	225	370	236	456	621	220
14	378	366	230	410	603	187
15	399	395	225	384	626	155
16	296	406	225	388	665	122
17	225	447	277	415	660	128
18	172	463	338	415	655	134
19	158	491	308	422	686	127
20	176	461	301	388	642	120
21	239	489	320	428	603	117
22	252	493	324	424	603	114
23	238	491	311	368	583	115
24	247	479	322	378	553	116
25	217	496	320	406	550	116
26	193	456	333	428	578	116
27	203	433	342	392	540	110
28	247	422	362	390	508	103
29	242	410	368	397	491	90
30	274	424	362	415	461	78
31	333		360	440		66
Mean	203	447	369	380	612	221
Acre-feet for month	12,400	26,600	22,600	23,400	36,400	13,600

NOTE—This is return water flowing in the main drain of reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation districts.

TABLE 170

DISCHARGE OF COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	507	507	499	609	172
2	----------	536	513	531	565	176
3	----------	507	513	528	690	176
4	----------	478	513	525	788	144
5	*262	464	481	551	716	98
6	284	484	432	586	684	108
7	307	441	389	565	681	106
8	262	427	438	554	623	104
9	247	510	421	600	574	86
10	251	539	413	618	545	86
11	284	542	410	658	539	89
12	292	542	424	693	525	82
13	309	542	416	707	528	76
14	334	565	446	722	586	76
15	362	589	418	710	577	72
16	365	583	387	702	507	76
17	369	571	374	699	490	69
18	372	586	356	716	473	73
19	375	577	311	699	458	76
20	378	571	309	728	387	76
21	382	594	334	722	391	76
22	405	583	338	722	394	76
23	461	571	331	788	376	80
24	531	568	360	800	316	90
25	572	551	362	812	280	90
26	621	539	362	803	231	85
27	476	522	370	836	222	80
28	710	516	374	866	221	63
29	650	522	416	833	181	60
30	621	522	435	761	173	60
31	557	----------	452	699	----------	60
Mean	**409	535	407	686	478	92
Acre-feet for month	**21,900	31,800	25,000	42,100	28,400	5,640

*Record started May 5th.
**27 days.
NOTE—This is return water flowing in the main drain of Reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation districts.

TABLE 171

DISCHARGE OF COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY, 1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	----------	250	869	468	559	757	283
2	----------	295	832	449	583	713	268
3	----------	339	804	449	589	692	268
4	----------	391	786	468	587	671	254
5	----------	404	761	507	587	650	254
6	----------	370	735	527	600	633	254
7	----------	527	722	509	612	610	218
8	----------	629	857	513	621	569	192
9	----------	587	967	531	621	533	150
10	----------	527	991	537	612	473	144
11	----------	485	960	543	593	553	146
12	----------	517	897	569	597	569	126
13	----------	539	876	529	603	573	121
14	----------	567	809	509	612	545	121
15	----------	551	737	507	603	511	118
16	----------	561	637	507	633	419	114
17	----------	531	571	507	644	503	117
18	----------	507	561	517	650	529	118
19	----------	497	553	517	646	513	121
20	----------	483	549	521	631	455	108
21	----------	527	551	531	635	409	102
22	----------	587	547	537	640	430	102
23	----------	658	537	565	646	476	92
24	----------	665	527	547	660	397	92
25	----------	698	507	547	673	333	102
26	----------	688	527	567	709	312	113
27	----------	658	547	567	739	316	124
28	*318	713	547	587	709	301	136
29	293	784	527	587	742	286	148
30	250	825	507	583	809	283	160
31	----------	848	----------	571	750	----------	160
Mean	**287	555	693	528	642	500	156
Acre-feet for month	**1,710	34,100	41,300	32,500	39,500	29,800	9,570

*Register installed April 28th.
**3 days.

NOTE—This is return water flowing in the main drain of Reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation districts.

TABLE 172

DISCHARGE OF COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY, 1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	----------	312	609	493	497	636	152
2	----------	373	647	504	495	613	127
3	----------	381	654	501	487	574	90
4	----------	348	622	507	471	661	75
5	----------	344	522	513	460	683	77
6	----------	371	489	511	471	631	75
7	----------	389	469	484	493	638	73
8	----------	443	438	471	493	613	73
9	----------	482	445	464	492	627	63
10	----------	500	471	473	491	641	71
11	----------	506	511	478	490	656	73
12	----------	515	570	486	489	671	62
13	----------	561	617	482	488	661	57
14	----------	570	654	464	487	636	57
15	----------	636	654	451	487	583	59
16	----------	642	624	451	491	544	54
17	----------	650	636	441	528	483	55
18	----------	659	577	449	511	441	56
19	----------	667	495	451	517	406	55
20	----------	676	434	458	524	331	54
21	----------	706	443	471	535	253	53
22	----------	717	504	467	519	209	48
23	----------	746	511	484	517	215	50
24	----------	777	519	508	552	224	51
25	----------	770	513	495	559	238	49
26	----------	727	506	495	554	186	51
27	*168	662	500	502	577	161	52
28	167	637	494	507	626	135	51
29	185	673	487	515	659	125	57
30	234	654	493	541	683	141	60
31	----------	592	----------	517	652	----------	90
Mean	**188	570	537	485	526	454	67
Acre-feet for month	**1,500	35,100	32,000	29,800	32,400	27,000	4,110

* Register installed April 27th.
** Four days.

NOTE—This is return water flowing in the main drain of Reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation districts.

TABLE 173

DISCHARGE OF BUTTE SLOUGH, 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	(1)	(2)	13.0	26.0	30.0	58
2	(1)	(2)	12.0	24.0	33.0	63
3	(1)	(2)	5.0	24.0	36.0	69
4	(1)	(2)	1.0	24.0	40.5	69
5	(1)	(2)	0.8	23.0	47.0	90
6	(1)	(2)	0.8	21.0	57	90
7	(1)	(2)	0.8	19.5	68	107
8	(1)	(2)	0.8	15.5	80	101
9	(1)	(2)	0.8	17.0	90	101
10	(1)	(2)	0.8	17.0	96	108
11	(1)	(2)	0.8	16.0	101	108
12	(1)	(2)	0.9	15.0	112	145
13	(1)	(2)	2.0	15.0	118	145
14	(1)	(2)	3.0	11.0	123	145
15	(1)	(2)	5.6	11.0	129	145
16	(1)	(2)	2.2	11.0	140	155
17	(1)	*32.0	7.0	10.3	146	88
18	(1)	29.0	11.5	15.0	123	145
19	(1)	27.5	14.2	20.5	118	135
20	(1)	29.5	14.2	57	112	129
21	(1)	29.0	11.0	68	107	123
22	(1)	25.0	11.0	68	101	118
23	(1)	26.0	11.0	68	96	112
24	(1)	27.0	11.0	80	90	107
25	(1)	24.0	11.3	80	85	101
26	(1)	21.5	11.3	80	80	96
27	(1)	19.5	11.3	80	74	90
28	(1)	19.0	30.0	75	69	80
29	(1)	17.5	30.0	80	63	80
30	(1)	15.0	29.5	80	58	80
31	(1)	----------	27.0	58	----------	80
Mean	30	27	9	39	86	106
Acre-feet for month	1,840	1,630	580	2,400	5,320	6,320
Monthly diversions below gaging station	236	365	409	284	205	16
Discharge to Sacramento River in acre-feet	1,604	1,265	171	2,116	5,115	6,304

* Gaging station established on June 17. Gagings taken at point about one mile above mouth of Butte Slough.
(1) Average of 30 second-feet estimated throughout May.
(2) Average of 30 second-feet estimated June 1 to 16, inclusive.

NOTE—In the summer months of a season such as 1924 there is practically no natural flow of Butte Creek reaching the Sacramento River. The greater portion of the discharge shown in this table represents return water from lands irrigated from the Feather River.

TABLE 174

DISCHARGE OF BUTTE SLOUGH, 1925

Day	Daily discharge in second-feet					
	*May	June	July	August	September	October
1	----------	590	258	107	127	313
2	----------	560	239	106	130	313
3	----------	390	243	107	131	306
4	----------	0	245	107	134	302
5	----------	0	264	105	139	296
6	----------	110	285	103	165	298
7	----------	560	281	103	175	299
8	----------	549	277	104	180	303
9	----------	536	264	104	185	311
10	----------	521	261	106	192	328
11	----------	507	252	108	205	324
12	----------	493	252	141	252	310
13	----------	478	251	129	268	294
14	----------	463	245	90	268	287
15	----------	448	239	91	265	237
16	----------	433	235	92	261	186
17	----------	418	234	89	268	186
18	----------	404	225	85	277	186
19	----------	386	218	88	287	170
20	----------	356	212	91	295	154
21	----------	329	206	98	305	137
22	----------	314	195	99	313	130
23	----------	326	194	100	318	114
24	----------	319	196	100	322	99
25	----------	313	191	100	313	98
26	----------	316	185	102	274	97
27	----------	307	177	107	283	98
28	----------	280	177	119	289	99
29	54	267	172	119	308	92
30	332	263	102	121	305	84
31	446	----------	103	126	----------	77
Mean	**277	401	222	105	241	210
Acre-feet for month	**1,650	22,200	13,600	6,430	14,300	12,900
Monthly diversions below gaging stations	----------	199	292	990	719	312
Discharge to Sacramento River in acre-feet	**1,650	22,000	13,300	5,440	13,600	12,600
Natural flow in Butte Creek (see table 35)	See note	See note	4	83	738	1,180
Net return water to Sacramento River (acre-feet)	See note	See note	13,300	5,360	12,900	11,400

* During the period, May 1st to 28th, water flowed into Butte Slough from the Sacramento River.
** 3 days.

NOTE—To determine the amount of this discharge which is strictly return water, the discharge for the station measuring natural flow in Butte Creek one mile west of the East Side Highway (see Table 35) is subtracted as shown above. However, the flow during May and June was probably all drainage of winter and spring run-off from Butte Basin and hence no net return water is shown for these months. The Butte Slough measurements represent the sum of the discharge of two stations, one on Butte Creek at about Mile 3 above the junction of Butte Slough with the Sacramento River at Mile 84 Left; the other, about one-quarter mile east of Butte Creek, on a large dredger cut carrying water from lower Butte Basin west to Butte Creek and joining the latter at about Mile 2 above the Sacramento River junction. This return water is practically all from lands irrigated by Feather River diversions.

TABLE 175

DISCHARGE OF BUTTE SLOUGH, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	305	234	190	461	426
2	----------	307	237	187	478	433
3	----------	301	245	189	466	440
4	*719	292	253	192	466	447
5	681	289	243	202	494	454
6	643	295	234	210	516	381
7	605	312	226	213	532	280
8	584	310	220	216	540	197
9	562	302	215	217	539	144
10	541	280	209	216	549	116
11	519	265	203	218	553	104
12	497	258	201	215	546	120
13	475	255	203	218	506	140
14	453	250	204	238	477	134
15	431	246	200	248	437	134
16	371	239	200	251	439	144
17	337	233	198	259	477	149
18	308	230	195	270	479	160
19	284	230	192	282	499	186
20	273	239	191	283	522	193
21	268	244	189	282	570	199
22	268	250	188	294	607	192
23	268	259	186	304	631	193
24	268	251	185	318	638	206
25	268	241	182	330	639	219
26	268	240	187	349	627	211
27	268	234	188	365	583	203
28	268	224	189	385	481	219
29	269	236	189	406	437	219
30	277	233	184	421	407	219
31	286	----------	188	436	----------	219
Mean	**402	262	205	271	520	228
Acre-feet for month	**22,300	15,600	12,600	16,700	30,900	14,000
Monthly diversions below gaging stations	44	243	435	248	114	0
Discharge to Sacramento River	**22,300	15,400	12,200	16,500	30,800	14,000
Natural flow in Butte Creek (see table 36)	**4,070	158	0	0	49	3,620
Net return water, Sacramento River	**18,200	15,200	12,200	16,500	30,800	10,400

* Record started May 4th.

** 28 days.

NOTE—To determine the amount of this discharge which is strictly return water, the discharge for the station measuring natural flow in Butte Creek one mile west of the East Side Highway (see Table 36) is subtracted as shown above. The figures in this table represent the sum of the discharge of two stations, one on Butte Creek at about Mile 3 above the junction of Butte Slough with the Sacramento River which is Mile 84 Left on the river; the other, about one-quarter mile east of Butte Creek on a large dredger cut carrying water from lower Butte Basin west to Butte Creek and joining the latter at about Mile 2.2 above the Sacramento River junction. This return water is practically all from lands irrigated by Feather River diversions.

TABLE 176

DISCHARGE OF BUTTE SLOUGH, 1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	446	250	275	299	312
2	----------	468	427	275	305	326
3	----------	524	385	276	317	332
4	----------	516	326	277	324	341
5	----------	569	268	279	328	345
6	----------	625	264	333	331	328
7	----------	718	260	321	333	298
8	----------	821	258	309	332	280
9	----------	724	256	295	331	275
10	----------	686	255	284	328	269
11	----------	637	255	288	321	264
12	----------	576	256	288	326	257
13	----------	530	256	286	321	252
14	----------	527	256	285	317	249
15	*535	497	257	281	314	244
16	514	484	259	277	311	237
17	490	424	259	277	310	230
18	467	362	261	276	310	222
19	445	342	264	283	310	218
20	422	321	264	279	310	218
21	411	314	263	274	306	209
22	395	311	262	264	304	209
23	381	304	261	253	299	207
24	380	296	265	284	295	203
25	380	284	271	283	241	200
26	374	272	272	279	226	200
27	366	266	268	277	206	202
28	372	260	264	276	206	207
29	393	258	270	279	228	219
30	402	254	278	284	286	237
31	424	----------	278	290	----------	252
Mean	**421	454	274	283	299	253
Acre-feet for month	**14,200	27,000	16,800	17,400	17,800	15,500
Monthly diversions below gaging stations	20	214	377	325	118	43
Discharge to Sacramento River	**14,200	26,800	16,400	17,100	17,700	15,500
Natural flow in Butte Creek (see table 37)	**9,640	4,980	397	200	179	397
Net return water, Sacramento River	**4,600	21,800	16,000	16,900	17,500	15,100

* Register installed May 15th.
** 17 days.

NOTE—To determine the amount of this discharge that is strictly return water, the discharge for the station measuring natural flow in Butte Creek one mile west of the East Side Highway (see Table 37) is subtracted as shown above. The figures in this table represent the sum of the discharge at two stations, one on Butte Creek at about Mile 3 above the junction of Butte Slough with the Sacramento River which is Mile 84 Left on the river; the other, about one-quarter mile east of Butte Creek on a large dredger cut carrying water from lower Butte Basin west to Butte Creek and joining the latter at about Mile 2.2 above the Sacramento River junction. This return water is practically all from lands irrigated by Feather River diversions.

TABLE 177

DISCHARGE OF BUTTE SLOUGH, 1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	198	326	279	233	210	84
2	221	323	272	231	209	106
3	244	315	270	231	207	118
4	267	306	270	230	206	120
5	290	296	270	227	203	115
6	313	285	268	232	195	102
7	336	277	264	237	201	105
8	359	265	258	238	209	114
9	382	256	245	236	218	112
10	375	253	243	236	225	115
11	364	256	250	234	238	106
12	345	260	253	235	262	99
13	327	265	255	234	246	96
14	317	275	256	233	249	96
15	299	285	257	231	253	93
16	290	297	250	231	262	78
17	289	301	247	227	254	75
18	297	297	250	237	247	82
19	305	295	249	263	242	83
20	314	294	245	260	236	70
21	301	293	249	250	242	71
22	296	294	253	241	254	73
23	300	297	250	236	263	83
24	306	299	249	235	259	90
25	316	293	247	238	216	104
26	325	291	244	240	134	107
27	325	287	242	241	113	105
28	323	297	240	233	105	105
29	322	295	238	227	91	111
30	321	289	235	222	108	107
31	324		234	216		118
Mean	309	289	253	235	312	98
Acre-feet for month	19,000	17,200	15,500	14,500	12,600	6,040
Monthly diversions below gaging stations	37	265	426	351	114	43
Discharge to Sacramento River	19,000	16,900	15,100	14,100	12,500	6,000
Natural flow in Butte Creek (see table 38)	7,040	782	167	0	222	903
Net return water Sacramento River acre-feet	12,000	16,100	14,900	14,100	12,300	5,100

NOTE—To determine the amount of this discharge that is strictly return water, the discharge for the station measuring natural flow in Butte Creek one mile west of the East Side Highway (see Table 38) is subtracted as shown above. The figures in this table represent the sum of the discharge at two stations, one on Butte Creek at about mile 3 above the junction of Butte Slough with the Sacramento River which is mile 84L on the river; the other, about one-quarter mile east of Butte Creek on a large dredger cut carrying water from lower Butte Basin west to Butte Creek and joining the latter at about Mile 2.2 above the Sacramento River junction. This return water is practically all from lands irrigated by Feather River diversions.

TABLE 178

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN, 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----	20	19	20	21	19
2	----	20	19	20	22	19
3	----	20	19	20	22	19
4	----	20	19	20	22	18
5	----	20	19	20	22	18
6	----	20	19	20	22	18
7	----	20	19	20	22	18
8	----	20	19	20	22	18
9	----	20	19	20	22	17
10	----	20	19	20	0	17
11	----	20	19	20	0	17
12	----	20	19	20	0	17
13	----	20	19	20	0	17
14	----	20	19	20	0	17
15	----	20	19	20	0	**17
16	----	20	19	20	0	----
17	----	20	19	20	22	----
18	----	19	19	20	22	----
19	----	19	19	20	22	----
20	*20	19	19	20	22	----
21	20	19	19	20	22	----
22	20	19	19	20	21	----
23	20	19	19	20	21	----
24	20	19	19	20	21	----
25	20	19	19	20	21	----
26	20	19	19	20	21	----
27	20	19	19	21	21	----
28	20	19	20	21	20	----
29	20	19	20	21	20	----
30	20	19	20	21	20	----
31	20	----	20	21	----	----
Mean	20	20	19	20	21	18
Acre-feet for month	476	1,160	1,180	1,240	980	530

*Pumping started May 20.
**Pumping stopped October 15.
NOTE—This is the drainage returned to the Sacramento River at Mile 68.8L from District 70.

TABLE 179

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN, 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	7	10	54	69	30	30
2	7	10	50	68	31	31
3	0	17	45	68	30	31
4	20	13	47	70	29	30
5	7	10	47	70	30	28
6	10	10	43	70	27	28
7	10	13	42	71	25	28
8	7	20	43	72	24	28
9	7	20	48	72	28	20
10	0	20	50	66	24	18
11	13	17	48	66	22	22
12	10	27	49	66	24	22
13	7	27	47	62	23	22
14	7	20	43	60	23	22
15	7	0	37	62	22	18
16	7	0	38	60	22	18
17	0	0	40	58	20	18
18	20	0	40	150	18	18
19	10	0	43	35	18	18
20	17	0	44	35	7	7
21	20	0	45	35	0	0
22	13	0	57	35	0	0
23	10	0	60	35	0	0
24	13	0	60	35	0	0
25	13	56	60	35	0	0
26	13	54	60	35	0	0
27	13	56	60	35	0	0
28	13	50	60	28	0	0
29	13	50	60	28	0	0
30	13	52	65	28	0	0
31	10	----------	67	28	----------	0
Mean	*11	**28	50	55	**24	**23
Acre-feet for month	*628	**1,090	3,070	3,380	**944	**905

*28 days.
**20 days.
NOTE—This is the drainage pumped back to the Sacramento River at Mile 68.8L from District 70.

TABLE 180

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	2	12	16	21	3	3
2	3	12	16	22	3	3
3	3	12	16	16	3	2
4	10	12	16	20	3	1
5	11	12	16	9	3	1
6	8	12	14	9	3	1
7	3	12	12	8	3	1
8	5	8	9	8	4	1
9	5	8	12	7	4	1
10	6	8	12	8	4	1
11	7	8	12	12	4	1
12	8	8	14	12	4	1
13	8	7	16	18	4	0
14	8	7	20	8	4	0
15	6	7	22	8	4	0
16	3	7	22	7	3	0
17	3	7	20	5	3	0
18	6	12	22	4	3	4
19	6	16	22	5	3	2
20	7	16	22	3	3	1
21	7	12	22	5	3	1
22	6	12	20	5	3	1
23	7	12	20	4	3	1
24	7	16	16	4	3	1
25	6	16	16	4	3	1
26	7	17	22	4	3	1
27	8	16	20	4	3	1
28	7	16	16	3	3	1
29	10	22	22	3	3	1
30	10	26	21	3	3	1
31	9	----	22	3	----	1
Mean	6.5	12.3	17.7	8.1	3.3	1.1
Acre-feet for month	400	729	1,080	499	194	69

NOTE—This is the drainage returned to the Sacramento River at Mile 68.8L from District 70.

TABLE 181

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN, 1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	*4	2	4	28	24	16	16
2	4	3	14	28	23	14	12
3	4	4	12	28	23	12	4
4	4	3	16	28	23	14	7
5	4	4	20	28	22	14	7
6	3	4	20	28	22	14	7
7	4	3	23	28	22	12	10
8	4	5	19	30	21	9	10
9	4	3	21	32	21	6	10
10	3	5	19	32	21	6	10
11	4	5	20	32	20	8	10
12	3	6	16	32	20	8	10
13	4	7	15	28	20	6	4
14	4	5	16	28	19	6	4
15	3	5	15	28	19	8	7
16	3	4	17	28	19	8	4
17	1	5	*18	28	18	6	4
18	4	5	18	28	18	6	4
19	3	5	24	28	16	6	4
20	2	7	26	28	14	5	4
21	3	6	27	27	14	5	4
22	3	8	29	27	16	5	4
23	2	6	28	27	18	5	4
24	3	5	30	26	18	6	4
25	3	6	30	26	18	8	4
26	2	5	30	26	16	8	4
27	3	6	30	25	14	9	4
28	2	6	30	25	12	11	4
29	3	5	28	25	14	12	7
30	2	5	28	24	14	14	10
31	----	5	----	24	14	----	10
Mean	3.2	4.9	21.4	27.7	18.5	8.9	6.8
Acre-feet for month	188	303	1,280	1,710	1,140	530	411

*Pumping April 1st to June 17th; gravity flow remainder of season.

NOTE—This is the drainage returned to the Sacramento River at Mile 68.8L from District 70.

TABLE 182

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN, 1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	*6	6	8	20	27	22	13
2	7	4	3	20	28	23	13
3	7	5	8	21	26	22	13
4	7	6	10	22	18	21	10
5	8	3	13	22	19	20	10
6	9	0	13	22	19	19	10
7	7	6	13	24	19	21	9
8	7	5	13	22	20	21	9
9	7	3	15	21	20	21	9
10	9	6	17	22	21	21	6
11	6	5	16	21	22	20	6
12	8	7	19	20	23	20	6
13	7	8	19	21	22	20	7
14	9	7	18	21	23	19	7
15	7	8	18	21	22	19	9
16	7	7	19	20	22	18	8
17	6	11	17	20	23	16	8
18	5	13	18	20	23	16	7
19	7	16	19	20	23	16	8
20	6	*11	19	21	23	16	8
21	6	13	19	21	23	16	7
22	6	13	19	22	23	14	6
23	6	13	19	22	24	14	7
24	5	13	19	21	16	13	8
25	4	13	18	20	15	13	8
26	8	13	19	22	16	13	7
27	4	18	19	21	18	15	7
28	5	17	20	22	21	16	7
29	4	16	19	22	22	16	7
30	4	17	20	24	22	15	7
31	----------	16	----------	24	22	----------	7
Mean	6.5	9.7	16.2	21.4	21.4	17.9	8.2
Acre-feet for month	385	593	965	1,310	1,320	1,060	504

*Pumping April 1st to May 20th; gravity flow remainder of season.
NOTE—This is the drainage returned to the Sacramento River at Mile 68.8L from District 70.

TABLE 183

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN AT ROUGH AND READY BEND, 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	132	0	0	113	*36	0.5
2	105	84	0	113	38	0.5
3	141	166	76	109	51	0.5
4	127	163	163	109	69	0.5
5	96	161	0	109	68	0.5
6	81	156	0	109	68	0.5
7	98	153	171	109	66	0.5
8	98	112	167	113	66	0.5
9	127	0	163	113	66	0.5
10	126	0	160	113	18	0.5
11	138	97	143	113	0	0.5
12	140	163	0	117	2	0.2
13	157	162	136	117	25	0.0
14	158	159	159	124	33	0.0
15	232	155	116	124	33	0.0
16	276	156	0	122	33	0.0
17	267	153	105	122	33	0.0
18	260	152	165	122	29	24
19	159	150	162	127	23	21
20	158	148	158	148	6	5
21	157	147	154	164	6	4
22	156	144	76	176	4	----------
23	154	107	127	188	10	----------
24	150	0	117	195	2	----------
25	149	85	82	205	2	----------
26	147	154	109	207	2	----------
27	146	151	109	207	2	----------
28	145	146	109	210	1	----------
29	144	142	109	179	1	----------
30	0	104	109	137	1	----------
31	0	----------	109	172	----------	----------
Mean	152	141	130	141	27	1.94
Acre-feet for month	8,780	7,280	6,450	8,700	1,550	119

*Gate opening cut down September 1.

NOTE—This represents drainage from District 108 discharged to the Sacramento River at Mile 44.0R. From April 9 to July 22 the water was pumped and for the remainder of the season it was discharged to the river through a newly constructed gravity outlet.

TABLE 184

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN AT ROUGH AND READY BEND, 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	36	48	50	42	37	0
2	27	0	49	42	37	0
3	14	0	48	43	37	0
4	23	0	47	44	36	0
5	33	116	46	44	36	0
6	28	0	45	44	36	0
7	19	0	44	44	36	0
8	25	0	44	44	36	0
9	0	0	44	44	35	46
10	42	145	44	44	25	45
11	27	0	44	44	12	44
12	27	0	44	44	0	43
13	27	0	43	45	0	43
14	24	0	43	45	0	0
15	23	0	43	45	0	0
16	0	0	43	44	0	36
17	40	0	42	44	0	0
18	26	0	42	43	0	0
19	27	0	42	42	0	0
20	25	0	42	42	0	0
21	26	0	41	41	0	0
22	31	0	41	41	0	0
23	0	66	41	40	0	0
24	45	66	41	40	0	0
25	28	64	41	39	0	0
26	29	62	40	39	0	0
27	24	60	40	38	0	0
28	25	58	40	38	0	0
29	26	56	40	37	0	0
30	0	54	41	37	0	0
31	68	----------	42	37	----------	0
Mean	*29	**72	43	42	**33	***43
Acre-feet for month	*1,570	**1,570	2,650	2,580	**721	***509

*27 days.
**11 days.
***6 days.

NOTE—This represents drainage from District 108 discharged to the Sacramento River at Rough and Ready Bend, Mile 44.0R. Prior to June 22d and subsequent to October 9th the water was pumped. For the remainder of the season it was discharged to the river through a gravity outlet.

TABLE 185

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN AT ROUGH AND READY BEND, 1926

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	*October
1	0	0	70	71	89	81	15
2	0	0	64	74	81	81	8
3	103	136	48	74	81	77	8
4	86	0	70	74	89	108	30
5	93	133	70	74	98	108	0
6	73	0	70	120	89	152	15
7	130	0	64	114	93	108	30
8	150	156	67	114	93	103	30
9	134	147	70	114	89	114	30
10	137	64	73	108	89	108	30
11	0	0	75	103	89	114	30
12	121	107	78	93	103	135	0
13	0	89	81	103	93	135	0
14	0	73	81	93	89	117	0
15	135	0	81	93	93	103	0
16	120	0	81	85	89	109	30
17	0	0	81	81	93	112	30
18	125	0	81	81	89	115	30
19	0	0	81	81	114	118	30
20	131	75	81	81	108	109	30
21	0	103	81	77	108	61	30
22	0	103	81	77	108	95	30
23	0	108	81	77	108	97	30
24	140	99	81	77	120	97	30
25	0	99	81	98	135	66	30
26	0	116	81	85	161	66	30
27	0	116	77	85	161	65	30
28	123	116	74	77	161	64	30
29	0	94	71	77	135	66	30
30	123	70	71	114	120	33	30
31	----------	70	----------	98	108	----------	30
Mean	64	67	78	89	106	97	23
Acre-feet for month	3,820	4,120	4,610	5,490	6,490	5,780	1,400

*Discharge for October estimated except days of no flow.

NOTE—This represents drainage from District 108 discharged to the Sacramento River at Rough and Ready Bend, Mile 44.0R.

TABLE 186

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN AT ROUGH AND READY BEND, 1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	*67	112	113	142	230	230	172
2	71	0	143	129	220	230	175
3	66	109	114	129	220	220	200
4	68	0	114	137	0	220	148
5	0	130	117	203	0	220	82
6	0	0	115	203	230	220	82
7	81	0	113	214	230	230	121
8	82	146	171	204	230	230	81
9	102	113	169	190	230	230	148
10	60	129	172	183	241	230	126
11	64	135	170	183	241	220	85
12	0	131	163	196	241	230	85
13	72	125	168	40	241	191	177
14	76	82	170	100	241	187	177
15	69	85	174	107	241	185	177
16	0	150	173	107	241	183	177
17	76	105	171	107	241	176	184
18	0	150	173	71	230	166	179
19	89	143	0	154	230	159	151
20	0	138	108	164	230	154	*126
21	101	150	*175	161	230	148	112
22	0	149	52	159	230	148	29
23	88	111	90	154	230	156	106
24	0	109	142	156	230	146	76
25	85	140	137	151	230	160	73
26	0	165	137	177	230	169	37
27	109	105	137	146	230	186	32
28	0	168	146	354	230	174	27
29	110	168	155	230	230	148	30
30	0	168	142	210	230	150	36
31	----------	165	----------	220	230	----------	*30
Mean	51	116	137	164	217	190	111
Acre-feet for month	3,050	7,100	8,180	10,100	13,400	11,300	6,820

*Pumping out April 1st to June 21st and October 20th to 31st. Remainder of season gravity flow.

NOTE—This represents drainage from District 108 discharged to the Sacramento River at Rough and Ready Bend, Mile 44.0R.

TABLE 187

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN AT ROUGH AND READY BEND, 1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	*25	128	184	128	146	149	36
2	27	84	*176	128	147	149	36
3	39	120	62	128	147	147	36
4	0	0	96	130	145	144	28
5	42	130	112	134	149	142	20
6	61	0	124	132	149	139	20
7	0	135	128	134	150	140	28
8	0	129	128	136	150	138	0
9	69	0	140	132	150	132	0
10	0	137	141	138	152	130	28
11	69	134	141	138	151	132	20
12	0	0	142	140	152	130	28
13	75	139	142	141	151	126	28
14	63	134	141	140	152	121	28
15	45	0	140	140	153	130	28
16	0	146	139	139	152	87	28
17	83	0	138	136	153	83	28
18	0	154	134	142	155	62	28
19	89	145	136	146	155	44	20
20	0	0	138	144	150	44	20
21	0	160	138	144	149	28	20
22	103	208	136	143	150	36	28
23	0	140	140	143	150	28	28
24	108	175	134	143	150	28	28
25	0	0	132	144	150	36	28
26	0	0	130	143	150	28	28
27	120	192	134	144	149	28	28
28	115	192	136	143	150	28	28
29	0	0	134	145	147	28	28
30	0	0	132	144	148	36	20
31	----------	0	----------	146	148	----------	20
Mean	38	90	134	139	150	89	25
Acre-feet for month	2,250	5,520	8,000	8,560	9,240	5,300	1,530

* Pumping out April 1st to June 2d. Remainder of season gravity outflow.

NOTE—This represents drainage from District 108 discharged to the Sacramento River at Rough and Ready Bend, Mile 44.0R

TABLE 188

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING, 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	149	277	294	280	150
2	----------	144	280	292	280	207
3	----------	164	280	242	280	210
4	----------	185	280	260	335	230
5	----------	205	241	278	340	250
6	----------	225	206	278	354	280
7	----------	236	206	265	321	300
8	----------	246	231	283	321	320
9	----------	256	231	283	314	309
10	0	266	232	265	321	294
11	25	283	199	265	296	252
12	51	286	231	265	308	190
13	76	327	267	209	309	167
14	101	337	241	199	297	156
15	127	336	241	200	282	114
16	152	346	242	233	293	116
17	177	351	241	258	291	119
18	224	356	241	268	289	147
19	266	356	180	296	288	142
20	256	356	180	295	287	139
21	247	356	280	307	284	152
22	238	356	334	343	282	144
23	228	311	326	343	280	116
24	220	283	326	333	296	124
25	210	284	294	339	312	147
26	200	283	308	338	310	122
27	192	283	294	323	266	92
28	172	283	280	323	230	63
29	164	280	280	323	197	e60
30	154	280	280	305	164	e60
31	155	----------	280	305	----------	e60
Mean	173	280	258	284	290	169
Acre-feet for month	7,210	16,700	15,900	17,500	17,300	10,400

e—Estimated.

NOTE—This represents the drainage from Colusa Basin passing down the back borrow pit of Reclamation Districts 108 and 787 and entering the Sacramento River at Knights Landing. It includes also the drainage from Sycamore Slough in District 787. This is all return water from irrigation.

TABLE 189

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING, 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	484	414	16	532	554
2	----------	515	483	387	591	559
3	----------	520	501	354	686	559
4	----------	431	507	346	719	544
5	----------	298	561	340	783	544
6	----------	313	622	359	832	540
7	----------	492	653	351	936	525
8	----------	21	620	341	1,065	476
9	----------	538	545	348	1,130	364
10	----------	466	464	376	1,163	282
11	0	188	395	375	1,148	268
12	60	266	355	435	1,125	242
13	110	453	324	468	1,085	231
14	56	461	309	517	1,045	195
15	0	446	295	529	806	167
16	0	417	299	482	821	137
17	0	462	307	470	979	129
18	0	504	319	499	1,037	127
19	0	511	336	520	984	124
20	0	491	344	544	923	121
21	0	480	333	573	862	118
22	0	499	370	529	741	116
23	115	499	355	516	741	114
24	260	511	360	467	747	112
25	320	511	361	474	734	110
26	330	504	378	486	745	108
27	345	457	398	625	738	108
28	360	409	433	488	713	106
29	418	428	451	460	688	104
30	440	458	16	456	687	90
31	462	----------	16	474	----------	85
Mean	*273	434	392	439	860	254
Acre-feet for month	*6,490	25,800	24,100	26,900	51,100	15,600

* 12 days.

NOTE—This represents the drainage from Colusa Basin passing down the back borrow pit of Reclamation Districts 108 and 787 and entering the Sacramento River at Knights Landing. It includes also the drainage from Sycamore Slough in District 787. This is all return water from irrigation.

TABLE 190

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	*0	564	544	514	705	315
2	70	525	548	525	651	322
3	145	525	552	560	655	355
4	220	544	544	564	735	349
5	250	488	541	560	789	322
6	190	454	529	564	743	263
7	0	461	496	596	743	260
8	70	454	496	596	751	209
9	145	458	477	584	709	180
10	220	518	477	621	663	209
11	250	544	477	621	659	209
12	295	560	477	655	663	209
13	340	556	488	684	684	198
14	385	552	496	692	705	171
15	*430	560	477	701	751	153
16	476	576	459	705	772	133
17	470	576	434	730	730	125
18	464	576	416	747	693	118
19	458	584	389	747	680	105
20	452	600	386	718	672	90
21	446	592	392	743	646	96
22	440	592	416	751	625	121
23	440	592	416	747	617	112
24	440	592	413	768	609	102
25	480	576	434	802	533	96
26	510	564	438	810	480	105
27	550	568	448	810	425	123
28	585	556	455	836	413	123
29	624	529	470	852	392	116
30	624	537	503	844	359	105
31	600	----------	507	810	----------	92
Mean	357	547	470	693	642	177
Acre-feet for month	22,000	32,400	28,900	42,500	38,200	10,900

* Estimated from observed head on outfall gate, May 1st to 15th.

NOTE—This represents the drainage from Colusa Basin passing down the back borrow pit of Reclamation Districts 108 and 787 and entering the Sacramento River at Knights Landing. There was no flow in 1926 from Sycamore Slough (interior drain of District 787) into the borrow pit during the period covered by this table.

TABLE 191

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING, 1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	*—32	1,540	550	655	830	401
2	—30	275	550	641	822	401
3	—24	1,400	515	655	810	385
4	—21	1,430	532	655	810	401
5	—14	1,460	550	655	818	401
6	—14	1,480	568	670	802	417
7	—14	1,510	585	673	770	427
8	—10	0	585	685	710	410
9	—10	330	585	692	692	374
10	—5	1,170	585	700	655	338
11	0	1,240	595	692	648	323
12	0	650	613	685	692	295
13	0	620	613	673	700	269
14	0	330	606	685	673	221
15	0	1,060	599	685	666	198
16	—6	900	592	685	655	187
17	—8	0	595	685	620	187
18	—10	0	603	692	655	221
19	—7	0	603	700	692	221
20	0	165	606	707	685	221
21	0	138	627	707	662	221
22	*0	700	638	711	644	210
23	385	655	648	700	611	198
24	374	610	655	700	579	175
25	660	616	655	715	547	164
26	1,820	613	648	742	514	164
27	640	603	641	750	481	148
28	—2	585	638	770	475	136
29	—2	592	641	782	481	124
30	1,130	578	662	818	465	112
31	1,620	----------	662	850	----------	100
Mean	+207	708	605	704	662	260
Acre-feet for month	12,700	42,100	37,200	43,300	39,400	16,000

* May 1st to 22d river was higher than borrow pit and estimated discharge into borrow pit is given for this period.

NOTE—This represents the drainage from Colusa Basin passing down the back borrow pit of Reclamation Districts 108 and 787 and entering the Sacramento River at Knights Landing. There was no flow in 1927 from Sycamore Slough (interior drain of District 787) into the borrow pit during the period covered by this table.

TABLE 192

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING, 1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	244	573	464	490	608	238
2	427	569	457	467	590	249
3	610	580	474	457	583	220
4	960	565	470	450	565	170
5	216	538	471	447	600	156
6	525	490	483	457	635	142
7	0	473	480	473	614	127
8	490	457	450	480	614	112
9	191	434	450	473	590	97
10	0	434	447	457	590	156
11	485	451	447	480	614	97
12	0	490	450	473	643	67
13	0	522	444	464	653	67
14	*0	562	425	473	649	67
15	*1,280	590	425	457	643	67
16	615	583	425	455	597	67
17	345	583	412	453	573	91
18	307	572	399	452	529	91
19	262	522	425	451	490	97
20	630	496	425	450	457	82
21	610	467	425	450	425	91
22	610	457	437	457	393	82
23	610	467	441	450	352	48
24	470	474	450	457	330	48
25	790	490	464	480	330	62
26	786	490	464	496	330	67
27	713	483	470	522	330	63
28	625	467	473	548	292	62
29	625	464	473	572	270	67
30	608	457	473	597	258	67
31	573	----------	483	608	----------	67
Mean	472	507	451	481	505	103
Acre-feet for month	29,000	30,200	27,700	29,600	30,000	6,320

*Where zero flow is shown the river was higher than borrow pit. A slight drop in the river below the borrow pit level permits an immediate large flow through the outfall gates.

NOTE—This represents the drainage from Colusa Basin passing down the back borrow pit of Reclamation Districts 108 and 787 entering the Sacramento River at Knights Landing. There was no flow in 1928 from Sycamore Slough (interior drain of District 787) into the borrow pit during the period covered by this table.

TABLE 193

DISCHARGE OF SACRAMENTO SLOUGH,* 1924

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	0	0	64	146	212	111
2	0	0	62	157	199	104
3	0	0	63	162	190	112
4	0	0	62	161	188	106
5	0	0	63	169	184	117
6	0	0	69	156	187	126
7	0	0	74	156	184	134
8	0	0	75	158	187	137
9	0	0	79	160	187	142
10	0	0	81	162	196	142
11	0	0	84	164	240	139
12	0	0	86	164	276	136
13	0	0	86	166	221	129
14	0	0	86	180	207	127
15	0	0	87	171	181	125
16	0	5	96	176	178	e120
17	0	10	104	174	170	e115
18	0	15	105	173	181	e115
19	0	15	**400	177	150	e115
20	0	20	300	183	226	e110
21	0	25	200	186	219	e110
22	0	30	172	198	196	e100
23	0	36	171	198	164	e100
24	0	38	165	183	152	e100
25	0	38	163	181	145	e 90
26	0	40	163	184	137	e 90
27	0	40	155	258	131	e 90
28	0	45	157	277	124	e 80
29	0	55	152	258	120	e 80
30	0	58	152	233	119	e 80
31	0	----------	151	210	----------	e 70
Mean	0	15.7	127	183	182	111
Acre-feet for month	0	933	7,790	11,200	10,800	6,850

*Water discharged through Sacramento Slough to the Sacramento River at a point just above the confluence of the Sacramento and Feather rivers. This is all return water from irrigation.

**The marked increase in flow on this day gradually dropping off on succeeding days was due to the entire removal of a dam which had been placed across the head of the slough. Prior to this date the water was carried through a wooden culvert in the dam.

e—Estimated.

TABLE 194

DISCHARGE OF SACRAMENTO SLOUGH,* 1925

Day	Daily discharge in second-feet					
	**May	June	July	August	September	October
1		371	429	329	336	271
2		373	427	327	336	259
3		384	425	324	337	221
4		422	421	330	337	217
5		411	419	328	338	199
6		403	417	334	340	208
7		418	413	332	351	190
8		414	412	322	353	149
9		413	410	320	355	147
10		409	399	318	358	143
11		418	397	317	357	112
12		412	396	339	365	107
13		420	394	370	373	100
14		401	402	364	382	98
15		415	401	354	388	74
16		426	399	353	395	71
17		436	389	352	394	68
18		437	387	351	403	73
19		437	385	340	427	77
20		436	374	331	424	67
21		473	372	331	410	87
22		357	369	331	406	93
23		433	367	332	397	100
24		432	365	332	368	105
25		454	362	333	358	109
26		429	352	333	353	114
27		460	350	334	348	118
28		451	347	335	338	123
29		330	345	335	327	129
30		430	335	335	306	121
31			332	335		113
Mean		417	387	336	365	131
Acre-feet for month		24,800	23,700	20,600	21,700	8,040

*Water discharged through Sacramento Slough to the Sacramento River at a point just above the confluence of the Sacramento and Feather rivers. This is return water from irrigation and represents the sum of measurements at three points as follows: (1) Discharge of Rec'amation District 1500 drainage to west borrow pit of Sutter By-pass, (2) Flow in west borrow pit of Sutter By-pass north of Chandler Station, (3) Flow in east borrow pit of Sutter By-pass at Chandler Station. All of the flow in the east borrow pit of the by-pass at Chandler represents return water from lands irrigated by Feather River diversions.

**Until about May 28th water was flowing from Sacramento River into Butte Slough and thence down Sutter By-pass into the river again. Discharges in May, therefore, were practically all natural run-off and not return water from irrigation.

TABLE 195

DISCHARGE OF SACRAMENTO SLOUGH,* 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	**700	519	390	404	457	181
2	697	524	420	358	393	170
3	565	450	420	410	385	181
4	562	461	420	394	393	179
5	530	383	418	388	392	181
6	514	437	387	403	398	181
7	525	373	382	313	390	179
8	491	419	389	418	390	174
9	480	410	375	405	389	168
10	469	401	377	398	383	169
11	457	358	360	427	373	178
12	**453	403	393	438	361	174
13	450	421	401	430	391	174
14	432	434	412	471	384	171
15	486	453	413	466	382	167
16	479	471	416	464	412	163
17	472	486	415	429	472	161
18	466	479	418	445	437	159
19	459	477	422	468	305	163
20	409	478	428	463	294	132
21	447	477	405	475	234	146
22	448	481	388	457	212	154
23	462	480	410	458	216	153
24	484	476	434	451	192	156
25	480	488	428	446	167	152
26	501	473	420	434	143	149
27	519	448	445	440	137	140
28	513	454	426	438	191	108
29	508	444	449	425	164	72
30	501	437	455	431	181	55
31	499		449	432		69
Mean	499	450	412	428	321	154
Acre-feet for month	30,700	26,800	25,300	26,300	19,100	9,440

*Water discharged through Sacramento Slough to the Sacramento River at a point just above the confluence of the Sacramento and Feather rivers. This is return water from irrigation and represents the sum of measurements at three points as follows: (1) Discharge of Reclamation District 1500 drainage to west borrow pit of Sutter By-pass. (2) Flow in west borrow pit of Sutter By-pass north of Chandler Station, (3) Flow in east borrow pit of Sutter By-pass at Chandler Station. Practically all of the flow in the east borrow pit of the by-pass at Chandler represents return water from lands irrigated by Feather River diversions.

**The record May 1st to 12th for discharge of west borrow pit of Sutter By-pass, which is a part of Sacramento Slough discharge, is estimated.

TABLE 196

DISCHARGE OF SACRAMENTO SLOUGH,* 1927

Day	Daily discharge in second-feet				
	**June	July	August	September	October
1	768	439	461	526	366
2	750	441	462	563	364
3	731	442	463	564	366
4	724	443	463	578	340
5	694	445	487	574	328
6	686	446	484	633	319
7	660	447	489	690	313
8	653	454	487	625	281
9	647	457	487	590	261
10	629	415	486	590	322
11	614	473	486	572	285
12	603	446	486	575	277
13	581	416	474	575	270
14	566	465	469	568	248
15	538	492	474	569	229
16	516	430	496	517	178
17	500	427	502	524	175
18	479	429	488	545	205
19	458	426	490	547	149
20	454	418	492	566	197
21	451	449	490	598	129
22	448	435	484	611	137
23	451	414	486	560	116
24	458	410	488	537	106
25	459	407	487	521	122
26	460	428	492	496	104
27	461	418	490	450	111
28	451	405	494	479	108
29	463	445	509	406	144
30	437	433	501	504	111
31	----------	456	524	----------	117
Mean	560	437	486	555	219
Acre-feet for month	33,300	26,900	29,900	33,000	13,400

*Water discharged through Sacramento Slough to the Sacramento River at a point just above the confluence of the Sacramento and Feather rivers. This is return water from irrigation and represents the sum of measurements at three points as follows: (1) Discharge of Reclamation District 1500 drainage to west borrow pit of Sutter By-pass, (2) Flow in west borrow pit of Sutter By-pass north of Chandler Station, (3) Flow in east borrow pit of Sutter By-pass at Chandler Station. Practically all of the flow in the east borrow pit of the by-pass at Chandler represents return water from lands irrigated by Feather River diversions.

**Prior to June the flow through Sacramento Slough included considerable natural run-off, storage in the by-pass draining out, etc. The early June discharges probably include some natural run-off also.

TABLE 197

DISCHARGE OF SACRAMENTO SLOUGH,* 1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	771	551	442	541	566	247
2	755	536	433	538	581	265
3	720	536	432	537	587	245
4	657	563	423	555	639	233
5	615	503	413	547	651	227
6	568	501	404	548	653	215
7	535	500	403	557	660	170
8	537	539	395	551	671	162
9	520	493	312	551	662	205
10	544	494	453	566	640	204
11	560	549	641	574	620	220
12	565	545	567	592	618	193
13	529	534	586	582	630	191
14	506	568	586	585	643	192
15	472	579	570	588	649	190
16	489	540	563	570	655	190
17	477	555	557	561	655	189
18	467	582	524	614	645	189
19	467	558	562	597	634	183
20	480	552	564	607	640	186
21	475	568	571	608	508	186
22	479	559	575	612	533	180
23	487	540	449	608	620	167
24	481	427	617	604	454	183
25	480	431	583	597	420	182
26	482	427	574	602	342	179
27	509	419	562	592	284	177
28	519	402	565	595	258	173
29	566	403	569	591	268	172
30	590	405	568	610	278	170
31	561	----------	558	602	----------	170
Mean	544	512	517	580	555	195
Acre-feet for month	33,400	30,600	31,800	35,600	33,000	12,000

* Water discharged through Sacramento Slough to the Sacramento River at a point just above the confluence of the Sacramento and Feather rivers. This is return water from irrigation and represents the sum of measurements at three points as follows: (1) Discharge of Reclamation District 1500 drainage to west borrow pit of Sutter By-pass, (2) Flow in west borrow pit of Sutter By-pass north of Chandler Station, (3) Flow in east borrow pit of Sutter By-pass at Chandler Station. Practically all of the flow in the east borrow pit of the by-pass at Chandler represents return water from lands irrigated by Feather River diversions.

TABLE 198

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN (PRITCHARD LAKE),* 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						Average of 8 c.f.s. during month
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23					*25	
24					*25	
25					26	
26					26	
27					27	
28					27	
29					27	
30					27	
31						
Mean for days operated					**26	8
Acre-feet for month					**416	491

* Drain water only pumped to Sacramento River at close of irrigation season. During the season it is repumped for irrigation. See notes in Sacramento River diversion tables for plant at Mile 16.0 left. No drainage to river in September and October of other years.

** 8 days.

TABLE 199

CONAWAY RETURN WATER, 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1						30
2						29
3						29
4						27
5						26
6						25
7						24
8						23
9						22
10						20
11						18
12						16
13						14
14						12
15						12
16						10
17						10
18					0	0
19					35	
20					34	
21					34	
22					33	
23					32	
24					32	
25					32	
26					32	
27					32	
28					32	
29					32	
30					32	
31						
Mean for days operated					*33	**20
Acre-feet for month					*776	**687

* 12 days.
** 17 days.

NOTE—This is return water from rice irrigation discharged back to the Sacramento River by gravity through the Conaway Ranch irrigation plant, Mile 12.0, right. During the irrigation season the drainage is repumped for irrigation. Conaway drainage also may discharge south to Yolo By-pass and not enter Sacramento River above Sacramento. No drainage through river plant in 1924.

TABLE 200

CONAWAY RETURN WATER, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1						18
2						22
3						22
4						25
5						29
6						29
7						25
8						22
9						18
10						18
11						15
12						15
13						15
14						15
15						15
16						15
17					29	15
18					18	15
19					18	15
20					18	15
21					18	15
22					18	15
23					18	15
24					18	15
25					18	12
26					16	12
27					16	9
28					15	9
29					15	9
30					15	9
31						9
Mean for days operated					*18	16
Acre-feet for month					*495	1,000

*14 days.

NOTE—This is return water from rice irrigation discharged back to the Sacramento River by gravity through the Conaway Ranch irrigation plant, Mile 12.0 right.

TABLE 201

CONAWAY RETURN WATER, 1927

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1						26
2						22
3						22
4						26
5						26
6						46
7						26
8						34
9						29
10						26
11						26
12						29
13						29
14						26
15					14	26
16					0	26
17					0	22
18					0	22
19					0	16
20					0	10
21					0	4
22					0	0
23					0	0
24					1	0
25					1	0
26					22	0
27					38	0
28					22	0
29					42	0
30					42	0
31						0
Mean for days operated					*23	25
Acre-feet for month					*381	1,030

* 16 days.

NOTE—This is return water from rice irrigation discharged back to the Sacramento River by gravity through the Conaway Ranch irrigation plant, Mile 12.0 right. In 1928 all drainage was to Yolo By-pass.

TABLE 202

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN (2d BANNON SLOUGH), 1925

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1				39		73
2		72			65	73
3			78			61
4		69				55
5					45	61
6			71		20	67
7		70				61
8			64	26	78	61
9		70		52	77	61
10					71	61
11					75	61
12		71			74	61
13						61
14		77		52	74	67
15					73	67
16		70			61	66
17			38	58		49
18						
19					67	55
20		70	32		74	
21				64	68	
22		32	32		67	
23					67	
24			32	65	37	
25		71			58	
26			45			
27				65	76	
28					75	
29					74	62
30				58		71
31						57
Mean for days operated		67	49	53	66	62
Acre-feet for month		1,330	776	948	2,720	2,600

NOTE—This is the drainage pumped back to the Sacramento River at Mile 2.1, left, from District 1000. No drainage pumped during irrigation season in 1924.

TABLE 203

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN (2d BANNON SLOUGH), 1926

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1							
2							
3		79	81	81			
4	65		80			74	64
5	65	79			74		
6	65	66					
7	145						
8	110			81		74	
9	149	72	81		74		
10	62						
11	70	66	81			68	65
12	71	66					
13	70				74		
14	68	79	74	81			
15	69					68	
16	70	80	81		74		
17	65	72				74	
18	46		81	81			64
19	81						
20	75	75	81		74	68	
21	78	72		7		79	
22				81		78	
23		33	81		74	77	
24							
25	71						
26			81				
27					74	78	
28	86			81			
29			81				64
30	80	81				77	
31				81	74		
Mean for days operated	79	71	80	72	74	74	64
Acre-feet for month	3,300	1,820	1,750	1,140	1,170	1,620	510

NOTE—This is the drainage pumped back to the Sacramento River at Mile 2.1, left, from District 1000.

TABLE 204

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN (2d BANNON SLOUGH), 1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	108	58	80			81	48
2	64	53		74	81		51
3	152		78				48
4	103	82				61	45
5	89			81			51
6	88					74	51
7	104	85	80				51
8	99			74	81	74	51
9	94	85					64
10	77		80			68	51
11	101	80		80			58
12	77		80		81		
13	88	78		81		74	32
14	44		80			73	48
15	70	89			74	40	45
16	76		80	81			
17	64	87					
18	69	86					51
19	65				81	81	
20	63	89		81		73	
21	66	80	80		81	73	
22	71				81	72	51
23	64	80			72	78	
24	71	80			64	65	
25	80		73	81		65	
26	62					65	
27	61					64	
28	53	80	81			51	
29	53			81		58	51
30	46	80				45	
31							
Mean for days operated	77	80	79	79	77	67	50
Acre-feet for month	4,610	2,520	1,570	1,420	1,380	2,650	1,680

NOTE—This is the drainage pumped back to the Sacramento River at Mile 2.1, left, from District 1000.

TABLE 205

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN (2d BANNON SLOUGH), 1928

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	76				26	44	25
2	146	31	51	47	26	44	
3	88			47	20	44	31
4	76	49	51	74	33	38	
5	88	67			26	44	25
6	88	67	44	54	26	38	
7	82	55			26	51	
8	76	37	44		33	69	
9	77	43			33	76	31
10	70	50	44		33	63	
11	68	56		54	33	63	
12	57	67	51		33	77	
13	51	61		47	26	77	
14	57	43			27	69	31
15	57	32	44			63	
16	57	25		54	33	63	
17	63	25	50	34	39	69	
18	63	25		27	33	63	
19	57	31	51	34	58	57	
20	57	31		20	46	57	31
21	57	31	44	34		38	
22	51	37			39	57	
23	57	43	44	40	65	50	
24	63	49		34	65	38	
25	77	25		27	65		
26	57	25	51	27	52	63	31
27	63	31		27	52	51	
28	57	25	38	34	52		
29	56	31		27	45	63	
30		31	44	27		25	
31				27			
Mean for days operated	69	40	46	38	39	56	29
Acre-feet for month	3,960	2,230	1,290	1,580	2,070	3,080	406

NOTE—This is the drainage pumped back to the Sacramento River at Mile 2.1, left, from District 1000.

TABLE 206

DISCHARGE OF BACK BORROW PIT, RECLAMATION DISTRICT 1000, 1926

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1	----------	16	0	0	3	20
2	----------	14	0	0	3	22
3	----------	13	0	0	3	24
4	----------	12	0	1	4	25
5	----------	10	1	1	4	25
6	----------	10	1	1	4	26
7	----------	11	1	1	5	26
8	----------	10	1	1	5	27
9	----------	8	1	1	5	27
10	----------	6	2	1	6	28
11	----------	4	2	1	6	29
12	*30	2	2	1	6	31
13	29	2	2	1	7	33
14	28	2	2	1	7	35
15	28	2	1	1	7	37
16	27	2	1	1	8	[1]37
17	27	2	1	1	8	37
18	26	2	1	1	8	37
19	25	3	1	1	9	37
20	25	4	1	2	9	37
21	24	5	0	2	9	37
22	24	6	0	2	9	37
23	23	5	0	2	8	37
24	23	3	0	2	8	37
25	22	1	0	2	8	37
26	**22	1	0	2	10	37
27	21	1	0	2	12	37
28	18	0	0	2	14	37
29	18	0	0	2	16	37
30	17	0	0	2	18	37
31	16	----------	0	2	----------	[1]37
Mean	[2]24	5.2	0.7	1.3	7.6	32
Acre-feet for month	[2]940	312	42	79	454	1,990

*Back flow from Sacramento River prior to May 12th.
**Discharge May 12th to 26th estimated. Probably all natural drainage (not return water).
[1] Discharge October 16th to 31st estimated.
[2] 20 days.

NOTE—This is water flowing down the borrow pit outside the east levee of Reclamation District 1000 and entering the Sacramento River just above the mouth of the American River. It is measured at the Garden Highway crossing. This drainage is probably not derived from Sacramento River sources. Not recorded prior to 1926.

TABLE 207

DISCHARGE OF BACK BORROW PIT, RECLAMATION DISTRICT 1000, 1927

Day	Daily discharge in second-feet					
	*May	**June	July	[1]August	September	October
1			2		0	8
2			2		0	8
3			2		0	8
4			1		0	9
5			1		0	10
6			1		0	11
7			1		0	12
8			1		0	13
9			1		0	14
10			0		0	14
11			0		1	14
12			0		1	14
13			0		1	14
14			0		1	14
15			0		1	14
16			0		1	14
17			0		2	14
18			0		2	14
19		8	0		2	14
20		8	0		3	13
21		8	0		3	12
22		8	0		4	11
23		8	0		4	10
24		8	0		4	9
25		8	0		4	8
26		8	0		4	7
27		8	0		4	6
28		5	0		4	5
29		2	0		4	4
30		2	0		4	2
31			0			2
Mean		2.7	0.4		1.8	10.4
Acre-feet for month		161	24		107	639

*No flow in May. River backed up into borrow pit.
**Back water until June 19th.
[1] No flow in August.

NOTE—This is water flowing down the borrow pit outside the east levee of Reclamation District 1000 and entering the Sacramento River just above the mouth of the American River. It is measured at the Garden Highway crossing. This drainage is probably not derived from Sacramento River sources.

TABLE 208

DISCHARGE OF BACK BORROW PIT, RECLAMATION DISTRICT 1000, 1928

Day	Daily discharge in second-feet					
	May	June	July	August	September	October
1		18	2		0	18
2		16	2		0	21
3		14	2		0	21
4		12	2		1	22
5		10	2		1	22
6		8	2		1	23
7		6	2		1	23
8		6	2		1	24
9		6	2		1	24
10		6	2		2	24
11		6	2		2	25
12		6	1		2	25
13		6	1		2	26
14	*30	5	1		2	26
15	30	5	1		2	26
16	30	5	1		2	27
17	32	4	1		2	27
18	31	4	1		3	27
19	30	4	1		3	27
20	29	4	1		3	28
21	28	3	1		3	30
22	27	3	1		3	32
23	26	3	1		5	32
24	25	2	1		7	32
25	24	2	1		8	33
26	22	2	1		9	33
27	23	2	1		10	33
28	24	2	1		12	33
29	23	2	0		14	33
30	22	2	0		16	33
31	20		0			33
Mean	15	5.8	1.3		3.9	27
Acre-feet for month	946	345	77		234	1,670

*River backed up into borrow pit May 1st to 13th.

NOTE—This is water flowing down the borrow pit outside the east levee of Reclamation District 1000 and entering the Sacramento River just above the mouth of the American River. It is measured at the Garden Highway crossing. This drainage is probably not derived from Sacramento River sources.

TABLE 209

DISCHARGE FROM RECLAMATION DISTRICT 1600 TO YOLO BY-PASS,* 1927

Day	Daily discharge in second-feet						
	April	May	June	July	August	September	October
1	0	0	12	17	16	26	84
2	0	0	12	18	16	30	45
3	0	0	18	16	16	21	0
4	0	0	9	16	26	30	0
5	0	9	25	14	26	25	41
6	0	0	18	22	26	17	38
7	51	0	20	22	26	24	35
8	51	0	20	20	26	21	33
9	51	0	18	20	17	18	30
10	51	15	19	20	25	24	28
11	51	12	16	19	25	21	25
12	51	16	16	28	25	21	20
13	50	12	16	28	25	24	18
14	50	0	18	28	26	24	16
15	50	0	16	25	26	24	14
16	25	0	18	28	26	24	12
17	25	0	18	20	25	30	10
18	25	0	16	22	25	32	8
19	25	0	16	20	25	14	6
20	25	0	16	20	30	29	4
21	26	15	7	22	30	24	2
22	26	12	7	29	25	24	1
23	26	0	3	25	29	38	1
24	26	0	12	14	25	38	1
25	26	9	23	16	30	31	1
26	26	12	23	17	26	84	1
27	26	12	18	16	30	84	1
28	26	14	16	17	26	84	1
29	26	0	18	17	30	84	1
30	25	0	18	20	25	84	1
31	----------	0	----------	17	25	----------	1
Mean	28.0	4.5	16.1	20.4	25.1	35.2	15.4
Acre-feet for month	1,668	275	960	1,259	1,546	2,096	951

*Drainage plant of Reclamation District 1600 in NW¼ Section 10, T 10 N, R 3 E. This water flows down east borrow pit of Yolo By-pass and does not reach the Sacramento River above Sacramento. No drainage pumped during irrigation season in other years covered by this bulletin.

CHAPTER V

USE OF WATER IN THE SACRAMENTO-SAN JOAQUIN DELTA

In Chapter III description and records were given of the diversion measurements on the Sacramento River and tributaries in the valley floor and on lower San Joaquin River channels from which diversions to the delta uplands are made. These diversions do not, however, comprise the total for the Sacramento-San Joaquin area. For a complete record the diversions or use of water in the extensive delta region must be included. This region comprises approximately 425,000 acres roughly bounded by a line running from Sacramento to Stockton to Tracy to Antioch and back to Sacramento. It is the area, largely at or below sea level, traversed by the multitude of deltaic channels through which the waters of the Sacramento, San Joaquin and Mokelumne rivers pass on to Suisun, San Pablo and San Francisco bays and thence to the ocean. Water for irrigation in this delta area is withdrawn from the many channels through countless numbers of culverts or floodgates, siphons, and pumps, the number of the latter, however, being relatively small. The floodgates and siphons may operate in accordance with tide levels and there may be a great variation in rate of diversion within a few hours. In many cases considerably more water is diverted than is actually required and the excess is returned to the channels by the main drainage pumps on the various islands and tracts. Under these circumstances an accurate and direct measurement of diversions, as on the upper river and in the uplands, is not practicable nor possible and the delta use of water must be otherwise determined.

The plans followed have included: (1) The determination of the consumptive use of water by accurate and detailed measurements on individual tracts or islands selected as representative of delta conditions in general; (2) the determination of net water applied to individual fields planted to a particular crop, and (3) the determination of the consumptive use of water by each of the major delta crops when grown in metal tanks under conditions closely approaching those of the fields in which the tanks are located.

Of these methods, the most satisfactory results in the work to date have been derived from the determinations for the entire tract of about 22,000 acres comprising the lower unit of Reclamation District No. 999, and from the determinations of the tank work. The delta soils may be classified generally as sedimentary or peat and the Reclamation District No. 999 tract is representative of the sedimentary areas. Measurements for an entire island in the peat soils proved to be unsatisfactory because of the undetermined but proportionately large amount of water derived from seepage. For reasons ascribed to be similar, the results of measurements of net water applied to individual fields in the peat show inconsistencies and are not conclusive. For the peat areas, therefore, the tank work has proven to be the most satisfactory method of attack.

The results of the Reclamation District No. 999 work indicates that the seasonal consumptive use of water is two acre-feet per acre for the sedimentary lands with a variety of delta crops. The tank work has furnished data on the consumptive use of water by individual

delta crops both on the peat and sedimentary soils and indicates, for each crop, a more or less well defined relation between use of water and yield. For a known or estimated average yield per acre of the crop, then, this relation may be used to derive the corresponding specific or average consumptive use of water in acre-feet per acre. The curves showing the "use-yield" relation as determined for the various crops are presented subsequently in this chapter. Roughly these show a variation in consumptive use of water for average observed yields from about one acre-foot per acre for celery to three and one-half acre feet per acre for corn.

With the consumptive use of water determined for a representative delta tract as in the case of Reclamation District No. 999 and for the various delta crops as in the tank work, the estimates for use of water by the entire delta area may be derived by using these data in conjunction with a complete census of the irrigated acreages and crops in the delta, together with information as to total and average yields for the various crops. With this procedure in mind, the first census of the irrigated acreages and crops was made in 1924, and since that time, it has been completed each year. Table 210 presents a summary of these data for the years 1924 to 1928, inclusive. In this table a segregation is made as between the Sacramento River delta and the San Joaquin-Mokelumne delta. In Table 212 the summary is again shown but with a segregation as between the peat and sedimentary soils. Tables 213 to 217, inclusive, show in detail the acreages and crops irrigated on each delta island or tract.

All of the investigations of the consumptive use of water on representative tracts, individual fields, or by crops grown in tanks, have been conducted in cooperation with the U. S. Department of Agriculture, Division of Agricultural Engineering and the University of California, Division of Irrigation Investigations and Practice. Major O. V. P. Stout, hydraulic engineer, has been in charge of this work from the beginning and has written for this bulletin the complete report which follows. (Page 358.)

It will be noted that in order to complete the estimate for the consumptive use of water by the entire delta area, there remains certain additional tank work with the delta crops not yet tried and with aquatic plants and growths. Also, the necessary information as to crop yields, to be used in conjunction with the use-yield curves, is to be obtained. When these data are available, a further report is to be prepared to summarize the complete investigation and present the best estimates for the consumptive use of water by the Sacramento-San Joaquin delta that the results of this investigation afford.

TABLE 210

SUMMARY OF ACREAGES AND CROPS IRRIGATED IN THE SACRAMENTO AND SAN JOAQUIN-MOKELUMNE DELTAS, 1924 TO 1928, INCLUSIVE

Crop	Sacramento Delta	San Joaquin-Mokelumne deltas	Total
1924—			
Alfalfa	12,211	18,823	31,034
Asparagus	38,880	15,249	54,129
Beans	19,252	17,207	36,459
Beets	18,995	2,380	21,375
Celery	745	3,320	4,065
Corn	770	26,622	27,392
Fruit	14,886	1,294	16,180
Grain	9,825	21,103	30,928
Hay		925	925
Onions	1,300	2,586	3,886
Pasture	223	812	1,035
Potatoes	1,021	26,851	27,872
Seed	460	470	930
Truck and miscellaneous vegetables	3,683	338	4,021
Totals	122,251	137,980	260,231
Crops not irrigated			
Grain	15,495	58,630	74,125
Hay	1,048	2,088	3,136
Pasture		1,180	1,180
Totals	16,543	61,898	78,416
1925—			
Alfalfa	13,104	12,907	26,011
Asparagus	37,678	14,296	51,974
Beans	24,020	13,570	37,590
Beets	12,831	3,854	16,685
Celery	952	4,378	5,330
Corn	1,935	22,094	24,029
Fruit	10,943	1,829	12,772
Grain	539	6,860	7,399
Hay	0	3,767	3,767
Onions	1,535	4,454	5,989
Pasture	505	4,768	5,273
Potatoes	1,351	20,720	22,071
Seed	2,569	890	3,459
Truck and miscellaneous vegetables	3,872	865	4,737
Totals	111,834	115,252	227,086
1926—			
Alfalfa	11,300	14,698	25,998
Asparagus	40,167	15,434	55,601
Beans	28,945	22,857	51,802
Beets	6,812	1,124	7,936
Celery	1,765	5,627	7,392
Corn	2,291	21,664	23,955
Fruit	16,288	1,483	17,771
Grain	1,844	30,015	31,859
Hay	333	1,004	1,337
Onions	2,193	3,617	5,810
Pasture	130	4,031	4,161
Potatoes	2,302	19,201	21,503
Seed	2,164	719	2,883
Truck and miscellaneous vegetables	5,431	1,040	6,471
Totals	121,965	142,514	264,479

TABLE 210—Continued

SUMMARY OF ACREAGES AND CROPS IRRIGATED IN THE SACRAMENTO AND SAN JOAQUIN-MOKELUMNE DELTAS, 1924 TO 1928, INCLUSIVE

Crop	Sacramento Delta	San Joaquin-Mokelumne deltas	Total
1927—			
Alfalfa	10,663	15,575	26,238
Asparagus	36,690	11,207	47,897
Beans	29,756	17,922	47,678
Beets	12,332	2,195	14,527
Celery	2,836	5,052	7,888
Corn	3,644	23,300	26,944
Fruit	16,041	1,220	17,261
Grain	3,765	30,368	34,133
Hay	190	400	590
Onions	1,761	2,579	4,340
Pasture	417	2,319	2,736
Potatoes	1,953	26,469	28,422
Seed	3,035	491	3,526
Truck and miscellaneous vegetables	3,344	246	3,590
Totals	126,427	139,343	265,770
1928—			
Alfalfa	11,593	15,080	26,673
Asparagus	39,372	14,599	53,971
Beans	23,841	14,588	38,429
Beets	11,736	2,986	14,722
Celery	3,574	4,239	7,813
Corn	6,929	33,339	40,268
Fruit	14,109	1,654	15,763
Grain	3,399	37,804	41,203
Hay	1,351	1,078	2,429
Onions	1,728	1,940	3,668
Pasture	180	6,104	6,284
Potatoes	1,137	23,777	24,914
Seed	4,817	1,636	6,453
Truck and miscellaneous vegetables	4,735	1,174	5,909
Totals	128,501	159,998	288,499

TABLE 211

AVERAGE PERIOD OF IRRIGATION FOR VARIOUS DELTA CROPS

Crop	Beginning	Ending	Days
Alfalfa	April 1	Sept. 15	168
Asparagus	May 15	Oct. 1	138
Beans	May 1	Sept. 15	138
Beets	April 1	Aug. 1	122
Celery	June 1	Oct. 1	122
Corn	June 15	Sept. 1	77
Fruit	May 1	Oct. 1	153
Grain	Sept. 1	Mar. 1	181
Hay	Sept. 1	Mar. 1	181
Onions	Feb. 1	July 15	165
Pasture	July 1	Nov. 1	*123
Potatoes	May 1	Oct. 1	153
Seed	Mar. 1	Oct. 1	214
Truck and miscellaneous vegetables	Feb. 1	Nov. 1	273

* There is also a certain amount of winter irrigation for pasture.

TABLE 212

GENERAL SOIL CLASSIFICATION OF THE DELTA LANDS IRRIGATED 1924 TO 1928, INCLUSIVE

Crop	Acreage irrigated									
	1924		1925		1926		1927		1928	
	Peat	Sedimentary	Peat	Sedimentary	Peat	Sedimentary	Peat	Sedimentary	Peat	Sedimentary
Alfalfa	*9,645	21,389	*5,913	20,098	*6,147	19,851	*4,773	21,465	*3,553	23,120
Asparagus	26,257	27,872	23,773	28,201	27,867	27,734	23,406	24,491	27,898	26,073
Beans	11,361	25,098	10,310	27,280	17,834	33,968	13,344	34,334	6,764	31,665
Beets	1,400	19,975	3,461	13,224	1,294	6,642	2,535	11,992	5,266	9,456
Celery	3,150	915	4,240	1,090	5,824	1,568	7,057	831	5,711	2,102
Corn	18,386	9,006	17,114	6,915	14,664	9,291	19,124	7,820	24,532	15,736
Fruit	**2,129	14,051	**2,113	10,659	**4,050	13,721	----------	17,261	----------	15,763
Grain	14,023	16,905	4,200	3,199	19,196	12,663	16,198	17,935	25,676	15,527
Hay	413	512	2,058	1,709	946	391	260	330	1,089	1,340
Onions	2,218	1,668	3,877	2,112	3,228	2,582	2,564	1,776	2,000	1,668
Pasture	682	353	2,438	2,835	3,841	320	1,604	1,132	4,591	1,693
Potatoes	21,559	6,313	17,917	4,154	17,721	3,782	25,894	2,528	23,295	1,619
Seed	140	790	585	2,874	647	2,236	391	3,135	561	5,892
Truck and miscellaneous vegetables	313	3,708	972	3,765	1,357	5,114	341	3,249	1,709	4,200
Totals	111,676	148,555	98,971	128,115	124,616	139,863	117,491	148,279	132,645	155,854

* The acreage upon which this alfalfa is grown is classed as peat on the soil maps but is more or less a mixture of sediment and peat along the border of the peat lands.
** Proportion of peat very small although classed as peat. Fruit acreage all listed as sedimentary in 1927 and 1928.

TABLE 213

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1924

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Andrus—Recl. Dists. 317, 407, 556		4,500			600		500					100		500	6,200	7,200
Bacon—Recl. Dist. 2028	40	213	1,951			183	12		138	205		2,570			5,312	5,620
Baird Estate								2,350				200			2,550	3,000
Bethel Tract		320	50		30	95									495	3,520
Bishop Tract—Recl. Dist. 2042		217		480		66			148	146	130	383			1,570	2,340
Boggs Tract—Recl. Dist. 404	560		20			250	65					50			945	2,650
Bouldin Island—Recl. Dist. 756		456	1,463		1,477		12			589		774	19	10	4,800	6,050
Brack Tract—Recl. Dist. 2033		500		150	100	150		3,000							3,900	5,000
Bradford Island—Recl. Dist. 2039		800				200		1,000							2,000	2,160
Brannan Island		1,870					600								2,470	7,700
Burton and Atherton										175		500			675	700
Byron Tract—Recl. Dist. 800	120					150		2,430							2,700	3,300
California Irrigated Farms—Recl. Dists. 2058 and 2062	2,323		100			2,165						600			5,188	14,000
Canal Ranch		2,500													2,500	3,100
Clifton Court—Recl. Dist. 802			365			1,940									2,305	3,200
Coney Island								1,000							1,000	1,060
Drexler Tract			500			1,050		250				200			2,000	3,200
Edinger-Johnson Recl. Dist.	60	35	55			20	100						20	35	325	330
Egbert Tract—Recl. Dist. 536		555		2,765										150	3,470	8,930
Empire Tract—Recl. Dist. 2029			481			865			42			1,973			3,361	3,680
Elmwood Tract												800			800	820
Fabian Tract—Recl. Dist. 773	200		1,800												2,000	6,000
Fay Island										20		40			60	80
Fern Island										110					110	120
Franks Tract			270			1,130				54		90		13	1,557	3,400
Grand Island—Recl. Dist. 3	160	9,535	1,940	1,130			5,314						50	315	*18,444	16,700
Hastings Tract—Recl. Dist. 2060		200	350					5,750		300					6,600	7,400
Headreach Island										25		150			175	200
Henning Tract—Porton of Recl. Dist. 2030	75									350		1,750			2,175	2,700
Hog Island								80							80	100
Holland Tract—Recl. Dist. 2025			10			330		1,998	4		32	1,003			3,377	4,280
Hotchkiss Tract—Recl. Dist. 799	60	440			30	25						160		25	740	3,740
Jersey Island—Recl. Dist. 830		1,000			60	600					500	400			2,560	3,500
Jones Tract (Upper)—Recl. Dist. 2039		110	512			1,554						220			2,396	6,230
Jones Tract (Lower)—Recl. Dist. 2038			427		93	1,682						96			2,298	5,740
King Island—Recl. Dist. 2044			432		199	1,284			80	225		560		28	2,808	3,260
Liberty Farm	16	425	3,833	942	50					275		201			5,742	10,000
Little Holland Tract			1,750	1,050											2,800	3,400
Ludley Tract												35			35	50
Mandeville—Recl. Dist. 2027			517							279		2,981	21	12	3,810	5,440

McDonald Island—Portion of Recl. Dist. 2030			521		40	200						1,048			1,809	3,440
Medford Island—Recl. Dist. 2041									40	25		1,100			1,165	1,200
Merritt Island—Recl. Dist. 150	1,500	300	150	800			1,000							500	4,250	4,920
Mildred Island—Recl. Dist. 2021			400							100		500			1,000	1,230
Orwood Tract—Recl. Dist. 2024	30	80	372		60	326			39	119		622			1,648	2,180
Palm Tract—Recl. Dist. 2036			36			736									772	2,470
Pierson District—Recl. Dist. 551	1,355	890	310	2,108			2,050				223	30		20	6,986	8,850
Prospect Island—Recl. Dist. 1667			2,400												2,400	2,580
Quimby Island			80			175						350			605	800
Randall Island—Recl. Dist. 755							350								350	400
Rhode Island												150			150	150
Rindge Tract—Recl. Dist. 2037												1,200			1,200	6,830
Roberts Island—Recl. Dist. 684 (L. D.)	1,500	500	100		50	3,400	50	4,500				200			10,300	10,500
Roberts Island—Recl. Dist. 524 (M. D.)	8,600		500			300						200			9,600	12,000
Roberts Island—Recl. Dist. 544 (U. D.)	2,600											700			3,300	8,900
Rough and Ready Island—Recl. Dist. 403	200					300	200	500				100			1,300	1,560
Ryer Island—Recl. Dist. 501	770	8,000	400			100	405								9,675	12,000
Sargeant-Barnhart Tract	150					564									714	1,200
Sherman Island—Recl. Dists. 341 and 50	300	4,000		1,000		500	150								5,950	13,000
Shima Tract—Recl. Dist. 2042									339	17		1,089			1,445	1,870
Smith Tract—Recl. Dist. 1614	280		400				200			30					910	2,330
Spud Island										70					70	100
State Farm	110					100	25	200	25						460	500
Staten Island		2,063	335		281	1,095					110	328			4,212	9,150
Stockton Acres—Recl. Dist. 828	160						40								200	750
Sutter Island—Recl. Dist. 349	500	300	200				800						100		1,900	2,200
Terminous Tract—Recl. Dist. 548		3,000			500	200						300			4,000	12,000
Tule Island												85			85	100
Twitchell Island—Recl. Dist. 1601		2,040	25		60							40			2,165	3,800
Tyler Island—Recl. Dists. 532 and 563		4,000				150	500								4,650	9,000
Union Island	815	1,015	4,300	1,500		1,730	210					1,030			10,600	23,000
Veale Tract		800			200										1,000	1,650
Venice Island—Recl. Dist. 2023												400			400	3,600
Victoria Island—Recl. Dist. 2040			480			450		4,795				1,315			7,040	7,240
Webb Tract—Recl. Dist. 2026		985	485			1,957			70	47	40	99			3,683	5,520
Widdow Island						50									50	50
Woodward Island						260						380			640	2,120
Wright Tract					200	800						60	30	50	1,140	1,320
Reclamation District 307	1,100			2,000										400	3,500	5,440
Reclamation District 348	1,000	250	300	250		200	400						400	200	3,000	10,000
Reclamation District 535														45	45	4,110
Reclamation District 551	15	240					50			40				15	360	640
Reclamation District 673	210													63	273	3,100
Reclamation District 744	550						440							510	1,500	1,500
Reclamation District 745	50						150								200	400
Reclamation District 746							122								122	250
Reclamation District 765	800														800	2,000
Reclamation District 813							220								220	1,400
Reclamation District 824	65														65	350
Reclamation District 900	2,000							2,000						1,000	5,000	11,000
Reclamation District 999	2,760	1,990	6,539	7,150	35		**1,935	1,075		685		650	290	130	23,239	23,500
Reclamation District 1002			50	50			200								300	7,000
Totals	31,034	54,129	36,459	21,375	4,065	27,392	16,180	30,928	925	3,886	1,035	27,872	930	4,021	260,231	423,000

* Total acreage of crops irrigated exceeds total acreage for district because of interplanting.
** Of this, 1,372 acres were interplanted. The interplanted crops are again included in other crop figures given.

TABLE 214

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1925

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[1]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Andrus—Recl. Dist. 317, 407, 556		4,500			600		600					100		500	6,300	7,200
Bacon—Recl. Dist. 2028	53	187	1,585			376			130	286		1,793	406	33	4,849	5,620
Baird Ranch						450						400			850	3,000
Bethel Tract	180	480	210	200	200	280		100				40		100	1,790	3,520
Bishop Tract—Recl. Dist. 2042		313		1,388						100	130	85			2,016	2,350
Boggs Tract—Recl. Dist. 404	1,200		50			50	100		100	10	400	50			1,960	2,650
Bouldin Island—Recl. Dist. 756		476	501		1,555	10	9		420	1,292		645	25	5	4,938	6,050
Brack Tract—Recl. Dist. 2033		1,700	25		200	250	65	800	290		1,125	80			4,535	5,000
Bradford Island—Recl. Dist. 2039		310	4			120								200	634	2,160
Brannan Island	300	1,870	50	620	600										3,440	7,700
Burton and Atherton					50					230		50	20		350	675
Byron Tract—Recl. Dist. 800	200					300			110			1,100			1,710	3,300
California Irrigated Farms—Recl. Dists. 2058 and 2062	1,936		450							100		50			2,536	10,293
Canal Ranch		2,400													2,400	3,300
Clifton Court Tract—Recl. Dist. 802	125		30			1,625			30				300		2,110	3,200
Coney Island								1,000							1,000	1,060
Drexler Tract			650		120	450						200			1,420	3,200
Edhardt Club			500												500	500
Edinger-Johnson Recl. Dist.	45	20	60				100				40				265	330
Egbert Tract—Recl. Dist. 536		1,000				10									1,010	2,700
Elmwood Tract																820
Empire Tract—Recl. Dist. 2029			583			938			88			340			1,949	3,680
Fabian Tract—Recl. Dist. 773								1,700							1,700	6,000
Fay Island										30		50			80	80
Fern Island										15		180			195	200
Franks Tract						1,000				75		200			1,275	3,400
Grand Island—Recl. Dist. 3	160	9,000	1,940	1,130	40	25	5,314	200		10		50	150	1,000	[2]19,019	16,700
Hastings Tract—Recl. Dist. 2060		250	175	1,010							465				1,900	7,400
Headreach Island										20		100	30		150	200
Henning Tract—Portion of Recl. Dist. 2030						20				300		1,700	10		2,030	2,760
Hog Island												50			50	100
Holland Tract—Recl. Dist. 2025	6	16	211			855				1	10	1,246	4		2,349	4,280
Hotchkiss Tract—Recl. Dist. 799	400	1,200	30		35	120								40	1,825	3,200
Jersey Island—Recl. Dist. 830		900	100	1,165	200	150				10	300				2,825	3,575
Jones Tract (Upper)—Recl. Dist. 2039			145			1,901			235	20		206			2,507	6,247
Jones Tract (Lower)—Recl. Dist. 2038			100		98	1,304			19	1		629		7	2,158	5,746

King Island—Recl. Dist. 2044	12		355		187	1,485			388	236		488	12		3,163	3,260
Liberty Farm		328	2,250	850						455				5	3,888	7,000
Little Holland Tract			2,600												2,600	2,705
Ludley Tract												35			35	50
Mandeville Island—Recl. Dist. 2027			545						152	335		1,985	8	4	3,029	5,440
March Garden Tract						150			50	50		100		50	400	400
McCormack Tract			1,550												1,550	1,550
McDonald Island—Portion of Recl. Dist. 2030						442				139		1,276			1,857	3,440
Medford Island—Recl. Dist. 2041												100			100	1,200
Merritt Island—Recl. Dist. 150	1,200	300	100	800			500						800	100	3,800	4,500
Mildred Island—Recl. Dist. 2021			125							250		450			825	1,230
Orwood Tract—Recl. Dist. 2024	50	160	310			478				146		213			1,357	2,180
Palm Tract—Recl. Dist. 2036			78			1,167			43						1,288	2,497
Pierson Dist.—Recl. Dist. 551	1,200	1,100	1,000	3,500								150	100		7,050	8,850
Prospect Island—Recl. Dist. 1667			2,400												2,400	2,580
Quimby Island			150	400		100									650	820
Randall Island—Recl. Dist. 755							350								350	400
Rhode Island			80												80	100
Rindge Tract—Recl. Dist. 2037					20					239		1,317			1,576	6,824
Roberts Island—Recl. Dist. 684 (L. D.)	840	550	700			950	100	60			300	850			4,350	10,500
Roberts Island—Recl. Dist. 524 (M. D.)	3,500		900				250				1,000	200			5,850	12,000
Roberts Island—Recl. Dist. 544 (U. D.)	800		400			125	90				200				1,615	8,900
Rough and Ready Island—Recl. Dist. 403	250				300		30	500						10	1,090	1,560
Ryer Island—Recl. Dist. 501	300	3,700					405								4,405	12,000
Sargeant-Barnhart Tract	140	80	114			623				10		200	15		1,182	1,200
Sherman Island—Recl. Dist. 341	300	3,500		500		200	50								4,550	9,000
Shima Tract—Recl. Dist. 2042										16		510			526	1,870
Smith Tract—Recl. Dist. 1614	80														80	1,800
Spud Island										45		125			170	170
State Farm	136		35	16	2	40	200	200	110	3	180	16		40	978	1,021
Staten Island		1,738	492		310	1,713					100	45		10	4,408	9,150
Stockton Acres—Recl. Dist. 828	200						150							50	400	750
Sutter Island—Recl. Dist. 349	500	300	200			850								100	1,950	2,200
Terminous Tract—Recl. Dist. 548	481	1,590	238	660	776	610			180	158	963	128			5,784	12,000
Tule Island										85		45			130	130
Twitchell Island—Recl. Dist. 1601		3,270			200		30								3,500	3,800
Tyler Island—Recl. Dist. 532 and 563	200	5,000	300			250	500								6,250	9,000
Union Island	1,068	900	2,830		25	600	282		795		60	100		210	6,870	23,000
Veale Tract						600									600	1,650
Venice Island—Recl. Dist. 2023		75										250			325	3,600
Victoria Island—Recl. Dist. 2040			800			1,000		1,500	200			2,000			5,500	7,313
Webb Tract—Recl. Dist. 2026		971	394			1,412			47	192		863		1	3,880	5,520
Widdow Island			50												50	55
Woodward Island								1,000				200	60		1,260	2,120
Wright Tract				25	300	500	3		80	60		30		100	1,098	1,320
Reclamation Dist. 307	800	50	250	1,000											2,100	6,000
Reclamation Dist. 348	1,250	250	300			50	400		300					5	2,555	10,000
Reclamation Dist. 535														40	40	4,110
Reclamation Dist. 554	30	200		30			60			100				15	435	640
Reclamation Dist. 673	100		300	300	2		10						120	200	1,032	3,100

[1] This includes acreages planted to field corn, Egyptian corn, kaffir corn and milo maize.

[2] Total acreage of crops irrigated exceeds total acreage of district because of interplanting and double cropping.

[3] Changes in total acreage figures from those as given in the 1924 report were made on a basis of more accurate information obtained in 1925. In the majority of cases the total acreage figures given in the 1924 report were those taken from general delta, county or project maps and figures shown for the same tract on the various maps are at considerable variance.

TABLE 214—Continued

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1925

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[3]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Reclamation Dist. 744	375		5	60			440						400	15	1,295	1,500
Reclamation Dist. 745	10		20				100						60		190	200
Reclamation Dist. 746							122								122	125
Reclamation Dist. 765	765														765	2,000
Reclamation Dist. 813	50		500				175						25		750	1,400
Reclamation Dist. 824	65		8	30											103	350
Reclamation Dist. 900	2,850		500	50			300						300	1,000	5,000	11,000
Reclamation Dist. 999	3,854	3,290	8,812	2,951	110		1,687	339		970		1,051	614	897	[2]24,575	23,500
Reclamation Dist. 1002			500				200								700	7,000
Totals	26,011	51,974	37,590	16,685	5,330	24,029	12,772	7,399	3,767	5,989	5,273	22,071	3,459	4,737	227,086	405,716

[1] This includes acreages planted to field corn, Egyptian corn, kaffir corn and milo maize.

[2] Total acreage of crops irrigated exceeds total acreage of district because of interplanting and double cropping.

[3] Changes in total acreage figures from those as given in the 1924 report were made on a basis of more accurate information obtained in 1925. In the majority of cases the total acreage figures given in the 1924 report were those taken from general delta, county or project maps and figures shown for the same tract on the various maps are at considerable variance.

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1926

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[2]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Andrus Island—Recl. Dists. Nos. 317, 407, 556	108	2,915	444		1,100	648	1,330	60						475	7,080	7,570
Bacon Island—Recl. Dist. 2028	16	167	2,028			292	5			282		1,658	362		4,810	5,620
Baird Ranch—Portion of Recl. Dist. 800						360		470							830	3,000
Bethel Tract—Recl. Dist. 1619															*	3,400
Bigger and Inman Ranch								1,000							1,000	1,000
Bishop Tract—Recl. Dist. 2042		297	20			574				147		133			1,171	2,350
Boggs Tract—Recl. Dist. 404	375						70	100							545	2,680
Bouldin Island—Recl. Dist. 756		630	841		1,701			1,084	555	672		656		5	[3]6,144	6,000
Brack Tract—Recl. Dist. 2033	25	1,750	10		445	500			25	20	140	30			2,945	4,660
Bradford Island—Recl. Dist. 2059		1,490	40			170					100				1,800	2,060
Brannan Island—Recl. Dist. 2067	110	2,345	445		135	325	580		20			55	6	325	4,346	7,260
Burton and Atherton Tract										200		200			400	675
Byron Tract—Portion of Recl. Dist. 800	260					150		2,400				175			2,985	3,320
California Delta Farms Company (West of Orwood Tract)	325														325	420
California Irrigated Farms—Portions of Recl. Dists. 2058 and 2062	2,383		941												3,324	10,290
Canal Ranch	100	507													607	3,300
Clifton Court Tract—Recl. Dist. 802	125	100				2,600		150				80	50	80	3,185	3,360
Coney Island			300			100					600				1,000	1,060
Deadhorse Island			180												180	200
Drexler Tract			210		70				10			230			520	3,230
Edinger-Johnston Recl. Dist.	45	20	70				100						25		260	330
Egbert Tract (see Recl. Dist. 536)																
Ehrhardt Club			500												500	500
Elmwood Tract															**	820
Empire Tract—Recl. Dist. 2029			995			988									1,983	3,680
Fabian Tract—Recl. Dist. 773			30			100		1,400							1,530	6,400
Fay Island										40		40			80	80
Fern Island			195												195	200
Fox Ranch (George R. Fox)	80		100												180	180
Franks Tract			530			805		290	20	110	500	1,160	30	10	[3]3,455	3,400
Grand Island—Recl. Dist. 3	160	8,000	2,500		60	50	5,314					100	150	1,000	[3]17,334	17,000
Hastings Tract—Recl. Dist. 2060	150	217													367	7,400
Headreach Island										50		100			150	200
Henning Tract (Portion of Recl. Dist. 2030)	50									185		1,605			1,840	2,700

* This island completely flooded, due to failure of levee, in July, 1926.

** These lands were not irrigated in 1926.

[1] This includes acreages planted to field, Egyptian and kaffir corn and milo maize.

[2] Changes in the total acreages from figures previously reported have been made on the basis of later information from the office of State Reclamation Board. Except as noted, these figures represent gross areas, i. e., include roads, canals, etc., and entire area within levees.

[3] Total acreage of crops irrigated exceeds total acreage of district or tract because of interplanting and double cropping.

TABLE 215—Continued

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1926

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[2]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Hog Island												100			100	100
Holland Tract (Little Holland—Seaborn)			2,235			560								60	2,855	2,860
Holland Tract—Recl. Dist. 2025			328			174									502	4,280
Honker Lake Tract	540		440		195			220							1,395	1,890
Hotchkiss Tract (see Recl. Dist. 799)																
Jersey Island—Recl. Dist. 830		1,000		850	740	145		675			50		155	475	[3]4,090	3,580
Jones Tract (Upper)—Recl. Dist. 2039			251			2,320			175			838			3,584	6,290
Jones Tract (Lower)—Recl. Dist. 2038			216		238	1,375						1,947			3,776	5,740
King Island—Recl. Dist. 2044	71	2	99	34	281	648	10			348		372		5	1,870	3,260
Liberty Reclamation District	9	410	3,830	310	52	219		330		580					5,740	6,750
Mandeville Island—Recl. Dist. 2027			1,075					2,922	129	216		845		4	5,191	5,440
March Garden Tract															**	400
McCormack Tract			1,500												1,500	1,550
McDonald Island—Portion of Recl. Dist. 2030			217			139				95		518	35		1,004	3,440
Medford Island—Recl. Dist. 2041												690			690	1,200
Merritt Island—Recl. Dist. 150	470	200	420	35		65	500	170	270	35	130		660	380	3,335	4,980
Mildred Island—Recl. Dist. 2021										305		545			850	1,250
Moreing Ranch (Lewis Moreing)—Portion of Recl. Dist. 2062	800					200									[4]1,000	1,980
Orwood Tract—Recl. Dist. 2024	73	114	256			105	35			35		169			787	2,180
Palm Tract—Recl. Dist. 2036						715							81		796	2,460
Pierson District—Recl. Dist. 551	600	340	315	3,950			2,585						20	15	7,825	8,850
Pocket, The (Roberts Island)	10		30			118									158	520
Prospect Island—Recl. Dist. 1667			2,400												2,400	2,480
Quimby Island			100	50											150	820
Randall Island—Recl. Dist. 755							350								350	400
Rhode Island			80												80	100
Rindge Tract—Recl. Dist. 2037					410			1,312		360		1,386			3,468	6,840
Roberts Island (Lower division)—Recl. Dist. 684	2,255	346	764		35	758	10	2,346	20		1,371	2,226		176	10,307	10,660
Roberts Island (Middle division)—Recl. Dist. 524	3,090		3,515			197	30	950							7,782	11,000
Roberts Island (Upper division)—Recl. Dist. 544	1,010		585			80	25							10	1,710	7,480
Rough and Ready Island—Recl. Dist. 403	140		160												300	1,700
Ryer Island—Recl. Dist. 501	280	6,990	1,260				565						30	200	9,325	12,000

Sargeant—Barnhart Tract	290	120	100			250		310				100		30	1,200	1,200
Sherman Island—Recl. Dist. 341	300	3,500		200		200	50	300							4,550	10,300
Shima Tract								1,635	10			170			1,815	1,870
Smith Tract (R. R. and N. A. Smith)						70									70	1,520
Smith Tract (see Recl. Dist. 1614)																
Spud Island												170			170	170
State Farm	220		20	15			200				50	40			545	1,020
Staten Island		1,738	785		367	1,848	208				100	20		10	5,076	9,260
Stockton Acres—Recl. Dist. 828	60						40								100	700
Sutter Island—Recl. Dist. 349	80	25	680				1,135						20	20	1,960	2,550
Terminous Tract—Recl. Dist. 548		4,090	70	155	955	870		1,860	20	310	1,120	125			9,575	12,360
Thompson—Folger Company Ranch								500							500	1,120
Tule Island			20							15		95			130	130
Twitchell Island—Recl. Dist. 1601		2,895	55		160		55								3,165	3,630
Tyler Island—Recl. Dists. 136, 364, 532, 563 and 807		7,264	200		100	100	500	600							8,764	9,000
Union Island	400	1,265	5,640	20		1,520	215	4,465	40			350		50	13,965	23,000
Veale Tract—Recl. Dist. 2065						650									650	1,360
Venice Island—Recl. Dist. 2023		65	340			1,020		686		130			4		2,245	3,880
Victoria Island—Recl. Dist. 2040			690			550		4,390				1,179			6,809	7,310
Webb Tract—Recl. Dist. 2026		1,018	541			658				75		339	2		2,633	5,520
Widdow Island												50			50	55
Woodward Island			200			320		850				600			1,970	2,245
Wright Tract			5		190	165				22		10		45	437	1,320
Reclamation Dist. 307	55		65	1,660			2	10	5	15			15	15	1,842	5,940
Reclamation Dist. 348	1,350	225					490					250			2,315	9,480
Reclamation Dist. 369							160								160	550
Reclamation Dist. 535															**	4,110
Reclamation Dist. 536	1,110	1,347	1,025		58		72			22		394			4,028	8,930
Reclamation Dist. 554	5	226	45				20						70	60	426	700
Reclamation Dist. 673	75		25				10							100	210	3,100
Reclamation Dist. 744	340	40	25				300						450	30	1,185	1,618
Reclamation Dist. 745			40				100						60		200	200
Reclamation Dist. 746							122								122	140
Reclamation Dist. 765	800														800	1,320
Reclamation Dist. 799 (Hotchkiss Tract)	415	510	30			130									1,085	2,120
Reclamation Dist. 813							175								175	2,550
Reclamation Dist. 824	45												30		75	460
Reclamation Dist. 900	3,000	5	500			50	400					30	400	1,550	5,935	10,240
Reclamation Dist. 999	3,558	3,428	10,186	657	100	74	1,663	374	38	1,541		1,723	228	1,201	[3]24,771	[3]23,570
Reclamation Dist. 1002							200								200	6,860
Reclamation Dist. 1614	235		60				145							140	580	1,770
Totals	25,998	55,601	51,802	7,936	7,392	23,955	17,771	31,859	1,337	5,810	4,161	21,503	2,883	6,471	264,479	420,000

** These lands were not irrigated in 1926.

[1] This includes acreages planted to field, Egyptian and kaffir corn and milo maize.

[2] Changes in the total acreages from figures previously reported have been made on the basis of later information from the office of State Reclamation Board. Except as noted, these figures represent gross areas, i. e., include roads, canals, etc., and entire area within levees.

[3] Total acreage of crops irrigated exceeds total acreage of district or tract because of interplanting and double cropping.

[4] Irrigated acreages for this tract were included under California Irrigated Farms in previous reports.

[5] Net acreage as follows: Lower Unit 21,924; Upper and Middle Units, 1,646.

TABLE 216

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1927

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[2]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Andrus Island—Recl. Dists. 317, 407, 556	20	2,370	950	.....	1,220	280	1,780	.....	.....	.....	.....	.....	.....	230	6,850	7,570
Bacon Island—Recl. Dist. 2028	.....	.....	1,065	.....	100	625	.....	.....	.....	126	.....	1,248	206	.....	3,370	5,620
Baird Ranch—Portion of Recl. Dist. 800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	3,000
Bethel Tract—Recl. Dist. 1619	.....	50	95	.....	60	75	.....	25	.....	.....	.....	.....	25	.....	330	3,400
Bigger and Inman Ranch	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	1,000
Bishop Tract—Recl. Dist. 2042	.....	284	9	112	.....	140	.....	.....	.....	183	.....	97	64	.....	889	2,350
Boggs Tract—Recl. Dist. 404	370	.....	.....	.....	.....	.....	35	.....	.....	.....	.....	.....	.....	.....	405	2,680
Bouldin Island—Recl. Dist. 756	.....	629	479	.....	2,022	73	.....	.....	.....	698	.....	869	96	3	4,869	6,000
Brack Tract—Recl. Dist. 2033	30	1,220	.....	.....	570	300	30	120	.....	.....	300	100	.....	.....	2,670	4,660
Bradford Island—Recl. Dist. 2059	.....	1,200	.....	.....	.....	300	.....	.....	.....	.....	50	200	.....	.....	1,750	2,060
Brannan Island—Recl. Dist. 2067	200	1,080	770	.....	780	100	520	.....	.....	.....	.....	.....	.....	260	3,710	7,260
Burton and Atherton Tract	.....	.....	100	.....	130	.....	.....	.....	.....	12	.....	110	.....	.....	352	675
Byron Tract—Portion of Recl. Dist. 800	450	.....	.....	.....	.....	750	.....	.....	.....	.....	.....	120	.....	.....	1,320	3,320
California Irrigated Farms—Portions of Recl. Dists. 2058 and 2062	3,102	.....	853	.....	.....	.....	.....	1,200	.....	.....	.....	.....	.....	.....	5,155	10,290
Canal Ranch	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	3,300
Clifton Court Tract—Recl. Dist. 802	.....	120	50	.....	.....	780	.....	1,800	.....	.....	.....	.....	.....	75	2,825	3,360
Coney Island	.....	.....	300	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....	400	1,060
Deadhorse Island	.....	.....	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	180	200
Drexler Tract	.....	.....	95	.....	140	120	.....	.....	.....	.....	100	190	.....	.....	645	3,230
Edinger-Johnston Recl. Dist.	.....	.....	.....	.....	.....	.....	65	.....	.....	.....	.....	.....	.....	.....	65	[7]690
Ehrhardt Club	.....	.....	150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150	500
Elmwood Tract	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	560	.....	.....	570	820
Empire Tract—Recl. Dist. 2029	.....	.....	580	.....	.....	1,788	.....	.....	.....	34	.....	.....	.....	.....	2,402	3,680
Fabian Tract—Recl. Dist. 773	.....	.....	550	.....	.....	560	.....	2,250	.....	.....	.....	.....	.....	.....	3,360	6,400
Fay Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	.....	85	.....	.....	100	100
Fern Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	195	.....	.....	195	200
Finck and Winler Ranch—Portion of Recl. Dist. 2062	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	600	760
Fox Ranch (George R. Fox)	80	.....	.....	.....	.....	.....	.....	100	.....	.....	.....	.....	.....	.....	180	180
Franks Tract	.....	.....	135	.....	200	475	.....	.....	.....	60	.....	610	.....	.....	1,480	3,400
Grand Island—Recl. Dist. 3	160	7,000	3,000	300	350	200	5,300	.....	.....	.....	.....	100	150	800	[3]17,360	17,000
Hastings Tract—Recl. Dist. 2060	215	235	115	750	65	970	60	2,780	.....	10	.....	60	.....	.....	5,260	7,400
Headreach Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150	.....	.....	150	200
Henning Tract—Portion of Recl. Dist. 2030	125	.....	.....	.....	.....	.....	20	50	.....	135	.....	1,500	.....	.....	1,830	2,700
Hog Island	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	.....	[3]150	100

Holland Tract (Little Holland—Seaborn)			2,100			700									2,800	2,860
Holland Tract—Recl. Dist. 2025	12					495									507	4,280
Honker Lake Tract			870			340		400							1,610	1,890
Jersey Island—Recl. Dist. 830		900		350	100	375		1,200			50				2,975	3,580
Jones Tract (upper)—Recl. Dist. 2039			109		65	1,846		[4]1,642				970			4,632	6,290
Jones Tract (lower)—Recl. Dist. 2038			120		40	775						1,244			2,179	5,740
King Island—Recl. Dist. 2044			25	984	139	86				134		101			1,469	3,260
Liberty Recl. Dist.		425	2,705	1,850		350		300							5,630	6,750
Mandeville Island—Recl. Dist. 2027			752							295		3,268			4,315	5,440
March Garden Tract															*	400
McCormack Tract			1,500												1,500	1,550
McDonald Island—Portion of Recl. Dist. 2030			90			355				87		1,857			2,389	3,440
Medford Island—Recl. Dist. 2041			342			175						399			916	1,200
Merritt Island—Recl. Dist. 150	1,170		500				400			60	400	40	1,100	100	3,770	4,980
Mildred Island—Recl. Dist. 2021										150		425		25	600	1,250
Moreing Ranch (Lewis Moreing)—Portions of Recl. Dists. 2058 and 2062	300		200					300			200				1,000	1,470
Orwood Highlands[5]	325														325	1,120
Orwood Tract—Recl. Dist. 2024	280	114	38			248						593			1,273	2,180
Palm Tract—Recl. Dist. 2036						321								15	336	2,460
Pierson District—Recl. Dist. 551	175	540	54	4,040	16		1,810	90							6,725	8,850
Pocket, The (Roberts Island)			150			105		250							505	520
Prospect Island—Recl. Dist. 1667			2,400												2,400	2,480
Quimby Island						75		400				300			775	820
Randall Island—Recl. Dist. 755							350								350	400
Rhode Island						80									80	100
Rindge Tract—Recl. Dist. 2037								[4]4,111				2,713			6,824	6,840
Roberts Island (Lower Division)—Recl. Dist. 684	2,470	460	620		30	1,755		845				1,170			7,350	10,660
Roberts Island (Middle Division)—Recl. Dist. 524	3,895		1,980			1,365	50	3,235							10,525	11,000
Roberts Island (Upper Division)—Recl. Dist. 544	805		845				50	405			100				2,205	7,480
Rough and Ready Island—Recl. Dist. 403	250		100			250								60	660	1,700
Ryer Island—Recl. Dist. 501	690	7,190	1,950				560	200							10,590	12,000
Sargeant-Barnhart Tract	185	110	20			305				20		53			1,175	1,200
Sherman Island—Recl. Dist. 341	300	3,500	100	240		500	50								4,690	10,300
Shima Tract												225			225	1,870
Smith Tract (R. R. and N. A. Smith)															*	1,520
Spud Island															*	170
State Farm	180		40			26	40	30			15	40		40	411	1,020
Staten Island			790		273	3,282					65	10		8	4,428	9,260
Stockton Acres—Recl. Dist. 828	60						40								100	700
Sutter Island—Recl. Dist. 349	64	45	420				1,284				17		80		1,910	2,550
Terminous Tract—Recl. Dist. 548		2,951	490	549	973	520			100	260	1,419	1,266			8,588	12,360
Thompson—Folger Company Ranch															[6]	1,120
Tule Island															*	130

*These lands were not irrigated in 1927.

[1] This includes acreages planted to field, Egyptian and kaffir corn and milo maize.

[2] Except as noted these figures represent gross areas, i.e., include roads, canals, etc., and entire area within levees.

[3] Total acreage of crops irrigated exceeds total acreage of district or tract because of interplanting or double cropping.

[4] Land flooded in the fall to improve conditions for plowing, etc. Not necessarily planted to grain.

[5] Listed previously as "California Delta Farms Co. (West of Orwood Tract)."

[6] Irrigated from canal system from Mokelumne River above Delta. No irrigation from Delta channels.

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TABLE 216—Continued

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1927

Island or tract	Acreage irrigated														Total acreage irrigated	Total acreage[2]
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn[1]	Fruit	Grain	Hay	Onions	Pasture	Potatoes	Seed	Truck and miscellaneous vegetables		
Twitchell Island—Recl. Dist. 1601			815		375	170	5			5		200		5	2,798	3,630
Tyler Island—Recl. Dists. 136, 364, 532, 563 and 807	40	1,223 7,060	130		20		480	70				250		6	8,110	9,000
Union Island	536	1,049	5,430			2,615	65	7,755				370			17,920	23,000
Veale Tract—Recl. Dist. 2065						85									85	1,360
Venice Island—Recl. Dist. 2023			115			335				350		994			1,794	3,880
Victoria Island—Recl. Dist. 2040			200			660		3,750				2,000			6,610	7,310
Webb Tract—Recl. Dist. 2026		955													955	5,520
Widdow Island						50									50	55
Woodward Island								200				1,800			2,000	2,245
Wright Tract			85	200	210	550			100	20		25		10	1,200	1,320
Reclamation Dist. 307	465		1,193	2,458		222	20	125					726	55	5,264	5,940
Reclamation Dist. 348	500	325					540	100	140				100		1,705	9,480
Reclamation Dist. 369							260								260	550
Reclamation Dist. 535			10										60		70	4,110
Reclamation Dist. 536 (Egbert Tract)	970	2,190	250	200				200							3,810	8,930
Reclamation Dist. 551		65	85		10		40						115	10	325	700
Reclamation Dist. 673			30											5	35	3,100
Reclamation Dist. 744			30				300						450		780	1,620
Reclamation Dist. 745[3]															[4]	[4]
Reclamation Dist. 746							100								100	140
Reclamation Dist. 765	300		500											15	815	1,320
Reclamation Dist. 799 (Hotchkiss Tract)	810	840				140		200			20				2,010	2,120
Reclamation Dist. 813							400								400	2,550
Reclamation Dist. 824	50												35		85	460
Reclamation Dist. 900	3,300	5	600			50	400					50	100	1,550	6,055	10,240
Reclamation Dist. 999	2,544	3,762	9,219	2,494		102	1,817		190	1,686		1,253	219	254	23,540	23,690
Reclamation Dist. 1002							40								40	6,860
Reclamation Dist. 1614 (Smith Tract)	150		140				250					30		10	580	1,770
Totals	26,238	47,897	47,678	14,527	7,888	26,944	17,261	34,133	590	4,340	2,736	28,422	3,526	3,590	265,770	421,000

[1] This includes acreages planted to field, Egyptian and kaffir corn and milo maize.
[2] Except as noted these figures represent gross areas, i. e., include roads, canals, etc., and entire area within levees.
[3] Area of Reclamation District No. 745 is included in Edinger-Johnston Reclamation District.
[4] Total for three units as follows: Lower, net acreage 21,924; Upper and Middle, 1,766.

ACREAGES IRRIGATED IN THE DELTA, 1928

Island or tract	Acreage irrigated																
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn	Fruit	Grain[1]	Hay	Onions	Pasture[1]	Potatoes	Seed	Truck and miscellaneous vegetables	Total acreage irrigated	Grain or pasture not irrigated[1]	Total acreage[2]
Andrus Island—Recl. Dist. 317, 407, 556	121	2,161	400	89	1,087	754	1,277	390	100		180		20	315	6,894		7,570
Bacon Island—Recl. Dist. 2028			237		30	1,084		235		183		521			2,290	396	5,620
Baird Ranch—Portion of Recl. Dist. 800						300							475		775	2,130	3,000
Bethel Tract—Recl. Dist. 1619		245	72			275		295			418	75			1,380	600	3,400
Bigger and Inman Ranch						700									700		1,000
Bishop Tract—Recl. Dist. 2042		283		315	60	149			13	100	124	130	55	157	1,386	675	2,350
Bishop Highlands											301				301		1,000
Boggs Tract—Recl. Dist. 404	400		15			20					15				450	726	2,680
Bouldin Island—Recl. Dist. 756		629	280		2,029	149		285	393	420		1,416			5,601		6,000
Brack Tract—Recl. Dist. 2033	60	1,827			380	785	40		80			100			3,272		4,660
Bradford Island—Recl. Dist. 2059		620	20			225						310			1,175		2,060
Brannan Island—Recl. Dist. 2067	466	2,114	544		510	814	458	417						135	5,458	735	7,260
Burton and Atherton Tract (see Rio Blanco Tract)																	
Byron Tract—Portion of Recl. Dist. 800	120					200		715			400	400			1,835	1,300	3,320
California Irrigated Farms—Portions of Recl. Dists. 2058 and 2062	4,579		800			250		1,840						50	[3]7,519	1,400	[3]10,290
Canal Ranch	45	1,840	200					315							2,400		[4]2,400
Clifton Court Tract—Recl. Dist. 802	120	220				2,490		300			200				3,330		3,360
Coney Island						1,000									1,000		1,060
Deadhorse Island						100		100							200		200
Drexler Tract	52		392	200		867			124		198	300			2,133	607	3,230
Edinger-Johnston Recl. Dist.[5]	45	20	85				175		20				10	35	390		690
Ehrhardt Club																500	500
Elmwood Tract			140			275						385			800		820
Empire Tract—Recl. Dist. 2029			135		35	1,319		877	50	10	169	445			3,040	110	3,680
Fabian Tract—Recl. Dist. 773	20		605			805		2,000			270	150			3,850	2,400	6,400
Fay Island												10			10		100
Fern Island[6]																	
Finck and Winler Ranch—Portion of Recl. Dist. 2062	568														568		760
Fox Ranch (George R. Fox)	80													100	180		180
Franks Tract	188					597		780			730			120	2,415	800	3,400

[1] In the delta census it has been difficult to get the correct segregation between irrigated and nonirrigated grain and pasture. Included in the grain and pasture columns are the acreages known to have been irrigated directly or those estimated to have received direct benefit through subirrigation. Acreages flooded in the fall either for general improvement or preparatory to the next season's grain crop are also included. Grain and pasture acreages considered as nonirrigated are shown in a separate column.

[2] Except as noted these figures represent gross area, i.e., include roads, canals, etc., and entire area within levees.

[3] This is not the total lands of California Irrigated Farms Company. Approximately 3,400 acres south of Tom Paine Slough is classed in the "Delta Uplands"—see "Delta Uplands Diversions from Tom Paine Slough."

[4] Total area formerly reported as 3,300 acres, but this included lands to the east not a part of the ranch and not under irrigation. Correct area Canal Ranch is 2,400 acres.

[5] Includes area of Reclamation District No. 745.

[6] Sold for Stockton Deep Water Project Right of Way.

TABLE 217—Continued

DETAIL OF ACREAGES IRRIGATED IN THE DELTA, 1928

Island or tract	Acreage irrigated																
	Alfalfa	Asparagus	Beans	Beets	Celery	Corn	Fruit	Grain[1]	Hay	Onions	Pasture[1]	Potatoes	Seed	Truck and miscellaneous vegetables	Total acreage irrigated	Grain or pasture not irrigated[1]	Total acreage[2]
Grand Island—Recl. Dist. 3	733	5,898	598	-------	856	240	3,815	330	115	-------	-------	-------	1,391	627	[4]4,603	1,000	17,000
Hastings Tract—Recl. Dist. 2060	315	504	150	1,823	118	1,823	-------	-------	-------	-------	-------	-------	-------	-------	4,733	-------	7,400
Headreach Island	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	130	-------	-------	130	-------	200
Henning Tract—Portion of Recl. Dist. 2030	100	-------	-------	-------	-------	-------	-------	150	-------	100	-------	1,200	-------	-------	1,550	-------	2,700
Hog Island	-------	-------	-------	-------	-------	100	-------	-------	-------	-------	-------	15	-------	-------	115	-------	150
Holland Tract (Little Holland—Seaborn)	-------	-------	1,640	-------	-------	960	-------	200	-------	-------	-------	-------	-------	-------	2,800	-------	2,860
Holland Tract—Recl. Dist. 2025	-------	-------	319	-------	-------	341	-------	161	-------	-------	-------	1,721	-------	-------	2,545	870	4,280
Honker Lake Tract	-------	-------	250	-------	-------	1,072	-------	363	-------	-------	-------	-------	-------	-------	1,685	-------	1,890
Hotchkiss Tract—Includes Recl. Dist. 799[3]	65	718	-------	-------	-------	120	-------	100	-------	-------	275	6	-------	85	1,369	1,500	[3]3,700
Jersey Island—Recl. Dist. 830	3	680	40	418	-------	667	40	785	25	-------	-------	-------	7	-------	2,665	-------	3,580
Jones Tract (Upper)—Recl. Dist. 2039	-------	-------	-------	-------	-------	1,975	-------	[5]2,655	-------	-------	-------	1,335	-------	-------	5,965	-------	6,290
Jones Tract (Lower)—Recl. Dist. 2038	-------	-------	-------	-------	113	920	-------	[5]1,860	-------	-------	-------	403	-------	-------	3,296	-------	5,740
King Island—Recl. Dist. 2044	4	-------	10	1,172	-------	643	-------	-------	-------	-------	-------	-------	-------	-------	1,829	1,216	3,260
Liberty Recl. Dist.	-------	420	2,436	590	215	725	-------	710	-------	580	-------	-------	-------	-------	5,676	-------	6,750
Mandeville Island—Recl. Dist. 2027	-------	-------	81	-------	-------	-------	-------	-------	117	36	-------	1,272	178	-------	1,684	2,931	5,440
March Garden and Brookside Tracts	176	-------	-------	-------	-------	-------	15	-------	-------	-------	-------	-------	-------	30	221	200	600
McCormack Tract	-------	-------	1,500	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1,500	-------	1,550
McDonald Island—Portion of Recl. Dist. 2030	-------	-------	35	-------	-------	267	-------	908	-------	24	-------	1,480	-------	-------	2,714	509	3,440
Medford Island—Recl. Dist. 2041	-------	-------	293	-------	-------	24	-------	-------	-------	-------	-------	772	-------	-------	1,089	-------	1,200
Merritt Island—Recl. Dist. 150	1,000	300	500	-------	-------	-------	940	-------	-------	-------	-------	-------	2,000	200	4,940	-------	4,980
Mildred Island—Recl. Dist. 2021	-------	-------	-------	-------	-------	-------	-------	-------	-------	135	-------	535	-------	50	720	-------	1,250
Morcing Ranch (Lewis Moreing)—Portions of Recl. Dists. 2058 and 2062	100	-------	600	-------	-------	-------	10	-------	-------	-------	-------	-------	600	-------	1,310	-------	1,470
Orwood Highlands	180	-------	60	-------	-------	-------	-------	90	-------	-------	-------	-------	-------	-------	330	-------	1,120
Orwood Tract—Recl. Dist. 2024	9	112	-------	-------	-------	216	-------	577	-------	-------	350	91	119	-------	1,474	-------	2,180
Palm Tract—Recl. Dist. 2036	-------	-------	-------	-------	-------	77	-------	[5]400	-------	-------	-------	-------	-------	-------	477	-------	2,460
Pierson District—Recl. Dist. 551	380	882	983	1,792	178	-------	1,952	-------	-------	-------	-------	-------	165	-------	6,332	-------	8,850
Pocket, The (Roberts Island)	30	-------	-------	-------	-------	200	-------	290	-------	-------	-------	-------	-------	-------	520	-------	520
Prospect Island—Recl. Dist. 1667	-------	-------	2,200	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	2,200	-------	2,480
Quimby Island	-------	-------	-------	-------	-------	400	-------	400	-------	-------	-------	-------	-------	-------	800	-------	820
Randall Island—Recl. Dist. 755	-------	-------	-------	-------	-------	-------	400	-------	-------	-------	-------	-------	-------	-------	400	-------	400
Rhode Island	-------	-------	-------	-------	-------	80	-------	-------	-------	-------	-------	-------	-------	-------	80	-------	100
Rio Blanco Tract[4]	-------	-------	40	-------	-------	-------	-------	200	-------	-------	175	260	-------	-------	675	-------	675
Rindge Tract—Recl. Dist. 2037	-------	-------	-------	-------	-------	-------	-------	[5]3,136	-------	-------	-------	2,674	-------	-------	5,810	-------	6,840
Roberts Island (Lower Division—Recl. Dist. 684	1,478	606	650	-------	-------	2,736	-------	1,630	-------	-------	877	1,369	-------	-------	9,346	1,270	10,660
Roberts Island (Middle Division)—Recl. Dist. 524	2,497	-------	1,640	-------	-------	1,570	30	800	-------	-------	-------	72	-------	-------	6,609	3,300	11,000

[illegible]	900	-------	70	-------	20	250	-------	92	-------	-------	40	70	-------	135	982	-------	1,700
Ryer Island—Recl. Dist. 501	777	7,173	1,508	150	-------	300	830	-------	-------	-------	-------	50	-------	-------	10,788	-------	12,000
Sargeant-Barnhart Tract	236	80	30	-------	-------	300	-------	500	-------	-------	-------	40	-------	-------	1,186	-------	1,200
Sherman Island—Recl. Dist. 341	390	5,240	-------	2,290	-------	1,020	110	560	-------	-------	-------	-------	-------	390	10,000	-------	10,300
Shima Tract	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	320	202	-------	522	1,045	1,870
Smith Tract (R. R. and N. A. Smith)	-------	-------	-------	-------	-------	300	-------	-------	-------	-------	-------	-------	-------	-------	300	1,200	1,520
Spud Island[6]	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
State Farm	215	-------	-------	-------	-------	95	100	-------	-------	-------	-------	-------	-------	-------	410	-------	1,020
Staten Island	88	1,822	180	400	-------	2,770	301	-------	-------	-------	137	226	-------	15	5,939	1,950	9,260
Stockton Acres—Recl. Dist. 828	75	-------	-------	-------	-------	-------	5	65	-------	-------	-------	-------	-------	47	192	-------	700
Sutter Island—Recl. Dist. 349	145	99	200	-------	-------	-------	1,287	80	-------	-------	-------	-------	276	225	2,312	-------	2,550
Terminous Tract—Recl. Dist. 548	100	3,390	519	369	1,395	595	-------	530	100	75	1,301	1,645	-------	-------	10,019	-------	12,360
Tule Island[6]	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Twitchell Island—Recl. Dist. 1601	10	830	430	260	275	172	25	280	75	60	-------	208	-------	60	2,685	250	3,630
Tyler Island—Recl. Dists. 136, 364, 532, 563 and 807	70	6,811	10	80	100	-------	245	100	160	-------	-------	-------	-------	270	7,846	200	9,000
Union Island—Recl. Dists 1 and 2	199	837	3,436	-------	-------	3,130	442	6,500	100	20	-------	180	-------	-------	14,844	7,500	23,000
Veale Tract—Recl. Dist. 2065	-------	-------	-------	-------	-------	90	-------	-------	-------	-------	-------	-------	-------	-------	90	800	1,360
Venice Island—Recl. Dist. 2023	-------	36	80	-------	22	171	-------	1,412	50	822	-------	730	-------	-------	3,323	-------	3,880
Victoria Island—Recl. Dist. 2040	-------	-------	350	-------	-------	1,000	-------	4,000	-------	-------	-------	1,950	-------	-------	7,300	-------	7,310
Webb Tract—Recl. Dist. 2026	-------	400	-------	-------	-------	-------	-------	555	26	-------	-------	519	-------	-------	1,500	3,485	5,520
Widdow Island	-------	-------	-------	-------	-------	55	-------	-------	-------	-------	-------	-------	-------	-------	55	-------	55
Woodward Island	-------	-------	-------	-------	-------	290	-------	400	-------	-------	-------	475	-------	-------	1,165	400	2,245
Wright Tract	160	4	-------	112	150	655	-------	-------	-------	15	-------	45	-------	-------	1,141	-------	1,320
Reclamation Dist. 307	450	-------	625	2,618	-------	10	45	-------	215	20	-------	-------	600	225	4,808	575	5,940
Reclamation Dist. 348	1,632	250	253	-------	-------	-------	551	-------	-------	-------	-------	-------	-------	30	2,716	-------	9,480
Reclamation Dist. 369	-------	-------	-------	-------	-------	-------	180	-------	-------	-------	-------	-------	-------	-------	180	-------	550
Reclamation Dist. 535	-------	-------	10	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	20	30	-------	4,110
Reclamation Dist. 536 (Egbert Tract)	628	2,544	-------	150	235	-------	-------	132	-------	-------	-------	-------	-------	-------	3,689	3,100	8,930
Reclamation Dist. 554	-------	85	164	-------	-------	-------	16	-------	-------	-------	-------	20	87	12	384	-------	700
Reclamation Dist. 673	43	-------	36	-------	-------	4	10	-------	-------	-------	-------	-------	-------	24	117	-------	3,100
Reclamation Dist. 744	15	-------	53	-------	-------	-------	257	-------	-------	-------	-------	-------	8	113	446	-------	1,620
Reclamation Dist. 746	-------	-------	-------	-------	-------	-------	85	-------	-------	-------	-------	-------	-------	-------	85	-------	140
Reclamation Dist. 765	250	-------	350	300	-------	-------	-------	200	100	-------	-------	-------	-------	40	1,240	-------	1,320
Reclamation Dist. 799 (see Hotchkiss Tract)	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Reclamation Dist. 813	16	-------	-------	-------	-------	-------	121	-------	-------	-------	-------	-------	-------	-------	137	-------	2,550
Reclamation Dist. 824	72	-------	4	-------	-------	14	-------	-------	-------	-------	-------	-------	-------	14	104	-------	460
Reclamation Dist. 900	3,500	5	500	-------	-------	50	400	-------	-------	-------	-------	150	-------	1,800	6,405	-------	10,240
Reclamation Dist. 999	2,167	4,286	10,415	1,594	-------	43	1,481	-------	566	1,068	-------	709	260	230	22,819	-------	[7]23,348
Reclamation Dist. 1002	-------	-------	400	-------	-------	400	-------	-------	-------	-------	-------	-------	-------	100	900	-------	6,860
Reclamation Dist. 1614 (Smith Tract and Tuxedo Country Club Farms)	-------	-------	160	-------	-------	-------	70	-------	-------	-------	-------	-------	-------	255	485	120	1,770
Totals	26,673	53,971	38,429	14,722	7,813	40,268	15,763	41,203	2,429	3,668	6,284	24,914	6,453	5,909	288,499	49,300	421,000

[1] In the delta census it has been difficult to get the correct segregation between irrigated and nonirrigated grain and pasture. Included in the grain and pasture columns are the acreages known to have been irrigated directly or those estimated to have received direct benefit through subirrigation. Acreages flooded in the Fall either for general improvement or preparatory to the next season's grain crop are also included. Grain and pasture acreages considered as nonirrigated are shown in a separate column.

[2] Except as noted these figures represent gross area, i. e., include roads, canals, etc., and entire area within levees.

[3] Listed previously as Reclamation District No. 799 (Hotchkiss Tract). The area of Reclamation District No. 799 is 2,120 acres, but the Hotchkiss Tract includes in addition to Reclamation District No. 799, lands to the west which are irrigated from delta channels. Hence total acreage figure is increased to 3,700 for the tract.

[4] Listed previously as Burton and Atherton Tract.

[5] Flooded in the fall for next year's crops.

[6] Sold for Stockton Deep Water Project Right of Way.

[7] Total net acreage for three units as follows: Upper Unit, 386; Middle Unit, 1,038; Lower Unit, 21,924.

COOPERATIVE IRRIGATION INVESTIGATIONS IN THE SACRAMENTO-SAN JOAQUIN DELTA

By O. V. P. Stout, Hydraulic Engineer,
Department of Public Works, Division of Water Resources.

This report deals with the work done and results obtained under a cooperative agreement of the following parties: United States Department of Agriculture, Bureau of Public Roads, operating through the Division of Agricultural Engineering; State of California, Department of Public Works, operating through the Division of Water Resources; University of California, Agricultural Experiment Station, operating through the Division of Irrigation Investigations and Practice. In addition to these, the Permanent Committee of the Sacramento-San Joaquin River Problems Conference contributed to funds for the first year of work and has continued with an active and helpful interest. The intensive field work in the delta has been done in the territory of the Holland Land Company in Reclamation District No. 999, on the property of California Delta Farms, Inc., and on a ranch of the Richmond-Chase Company. The officers and employees of all of these, and in some instances the tenants, have at all times accorded the most liberal and thorough cooperation.

The project was initiated in 1924 and has continued through each subsequent season to date. This account will cover operations to the close of the season of 1928.

The primary purpose of the undertaking was to determine the consumptive use of water in the Sacramento-San Joaquin Delta. Incidental and appurtenant investigations have been made as necessity demanded or as exceptional opportunity presented.

Consumptive Use of Water.

Consumptive use of water in any given period of time on an area, as the term is used in this work, is defined as the amount of water which is parted with beyond recall or reuse on the area and is not returned to the source of supply. It amounts ordinarily to the sum of the following elements: transpiration from growing plants, including crops, weeds, trees and all marginal growths; evaporation from water and ground surfaces; and deep percolation into formations through which it passes out of the area and beyond subsequent identification. Under circumstances which make the direct determination of these elements—either singly or in combination—impossible or unduly difficult or uncertain, resort must be had to indirect determination, either as a sole reliance or as a check on the direct determination. In such case use may be made of the elementary fact that if, to the ground storage of water beneath an area at any instant, there be added the amount of water entering the area in any given period of time following that instant, the sum will be equal to the result obtained by adding the ground storage at the end of the period to the amount of water withdrawn from the area during the period. This proposition, in equational form, may be written thus: initial ground storage+rainfall+water entering on the surface+water entering by seepage=final ground storage+water leaving on the surface+water leaving by seepage+deep percolation+evaporation from water and ground surfaces+

transpiration from growing plants. Substituting symbols for the respective terms, the equation becomes:

$$G_1 + R + I + S_i = G_2 + D + S_o + P + E + T, \text{ or}$$
$$E + T + P = (I - D) + (S_i - S_o) + (G_1 - G_2) + R$$

That is to say that ordinarily, consumptive use, consisting of evaporation, transpiration and deep percolation, is equal to the sum of the following: the excess of water applied in irrigation over that drained and wasted from the area; the excess of inward seepage over outward seepage, including deep percolation; the groundwater decrement; and rainfall.

It is doubted that deep percolation occurs in the delta. The fact that the entire region lies at approximate sea level, with the water surface in the channels higher than the land, seems to preclude such a possibility. The same reasoning relieves the investigations of the consideration of seepage outward from the islands or principal tracts. Seepage outward from individual fields and smaller tracts may, however, be a factor, although difficult to determine quantitatively. In any case which presents a material decrement or increment of surface storage, that should also be rated as a factor to be determined.

The Sacramento-San Joaquin Delta.

The Sacramento-San Joaquin Delta, in the State of California, is of economic interest because of:

(a) The vast sums of money which have been spent to reclaim it from swamp and overflow, and

(b) Its proved capacity for production.

It consists of that area of flat land, approximately at sea level, traversed by the multitude of deltaic channels through which the waters of the Sacramento, San Joaquin, and Mokelumne rivers, coming down from the Sierra and the upper valleys, pass on to the sea.

The deltaic area amounts to nearily a half-million acres, the equivalent of about twenty government townships or of a square 27 miles on a side. It is situated in the counties of Yolo, Sacramento, Solano, San Joaquin and Contra Costa, extending on the north to within ten miles of the city of Sacramento, on the south to include Tracy, on the east to Stockton and on the west to the upper end of Suisun Bay. The subdivision, as ordinarily presented (see Table 217 and pocket map) includes more than one hundred tracts, either bordering on the channels or entirely surrounded by them.

In the work of reclamation the natural channels have been supplemented by a number of dug channels of size to rank with the natural ones. No official or precise estimate of the total length of navigable channels is at hand, but it probably falls between 600 and 800 miles.

The courses of the channels are for the most part between levees. The modern standard, to which the majority of them conform, is a levee of liberal height, with substantial base and crown widths. There are in the aggregate, according to a current estimate, about 1500 miles of levees. This figure is not inconsistent with the above maximum estimate of 800 miles for the length of channels.

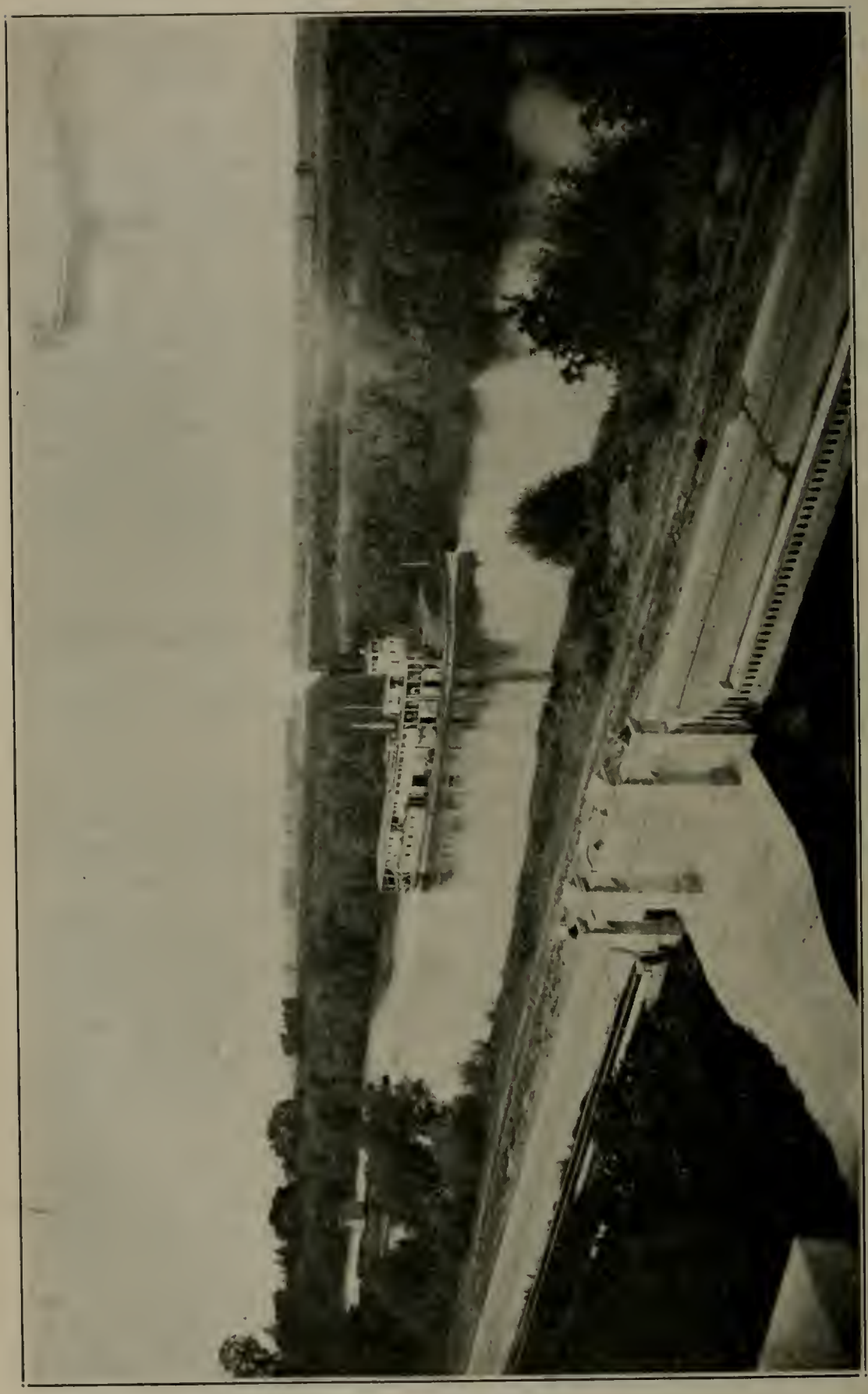


PLATE 8—Along the Victory Highway in the Sacramento River Delta.

The water surface in the channels rises and falls with the ocean tides. Even at low tide the water surface is ordinarily higher than the surface of the greater part of the land which is protected by the levees.

The current classification of the lands throws them into two general divisions: sedimentary and peat. The sedimentary lands occupy the outlying areas of the region and strips adjacent to the natural channels. They lie usually at elevations slightly higher than the peat. The peat lands are mostly in the interior of the region as a whole. The peat varies from a mere surface covering to beds fifty feet or more in thickness. From ten to thirty feet may be considered an ordinary range of thickness in the area of distinctly peat formation. The beds of greater thickness rest commonly on a sandy blue clay. In the more shallow beds this is varied by yellow clay, and sand of various hues and textures.

The peat lands present many features in striking contrast to ordinary soils. It has been remarked that according to the definitions in the text books they are not soils at all, but are soils only in the sense that they produce crops. In the virgin state the texture is coarse fibrous, carrying varying small proportions of sediment. Under cultivation the fiber decomposes, giving a light material, very easily worked. When the surface of a field is moderately dry the footing is as if walking on velvet. When very dry it becomes a light fluff, the finer particles of which enter the shoes of one walking in it and even penetrate two pairs of socks and reach the skin. It is markedly irritating, in temporary fashion, to sensitive skins. A man jumping on the surface of a field will produce startingly distinct quakes for a distance of from fifteen to fifty feet from where he stands. The complete drying out of the surface rarely extend to a depth greater than three or four inches, and the transition to a high degree of moisture beneath is abrupt. The cultivated top soil is black, completely so when moist. The peat immediately beneath the surface two feet or so is called "buckskin." The name is suggestive of the color, although "black and tan" might be more accurately descriptive. Owing, in part at least, to the very light weight of the peat soil its moisture-holding capacity in terms of percentage of dry weight of the soil is enormously beyond that of ordinary soils, amounting frequently to several hundred per cent. Most of the soil coefficients in common use, such as moisture equivalent hygroscopic coefficient, and the like, have no meaning or application in connection with these soils. An oven-dried sample will refuse water for an indefinite length of time. Burned-over areas have sometimes shown for a while the same tendency. Accidental sudden flooding of relatively dry fields, such as are found following the harvest of non-irrigated grain crops, has sometimes resulted in the detachment and floating of blocks of land. These blocks are called "floats." They are reduced, in the new positions in which they settle, either by burning or by grading down. The peat is combustible, although there is a tendency for it to become less so with cultivation when it carries the larger proportions of sediment. Care is necessary in order to avoid accidental fires of great persistence. Burning, however ill-advised it may be in the long run, is still frequently resorted to for cleaning the ground of weeds and pests. In such case suitable control conditions are established before setting fire.

The proportion of area of peat to sedimentary lands is about as three to four.

From the beginning of reclamation of delta lands drainage forced itself upon the attention as an essential part of the process. Somewhat later it was realized that irrigation is also necessary. The present method of drainage will be best understood if described in connection with irrigation.

PLATE 9—Loading Celery from Levee, San Joaquin River Delta.

Water for irrigation is withdrawn from the channels by three methods, viz:

(a) Through culverts of various sizes, materials and forms of cross-section, laid horizontally or nearly so, beneath the levees. The local term for these is "flood gates."

(b) Through pipe siphons with summits just beneath the crowns of the levees. With one exception, the extreme range of diameter of plain siphons known to this writer is from 6 to 24 inches; the ordinary range from 8 to 14 inches. The exception is a steel siphon 60 inches in diameter, through which flows about 40 per cent of the water required for the irrigation of 22,000 acres of sedimentary land. In addition to the plain siphons, the discharge and suction pipes of drainage pumping plants are frequently operated in reverse direction, as siphons, from the channels to the lands to supply water for irrigation.

(c) By pumping. A considerable but minor proportion of the water for irrigation is withdrawn from the channels by this means.

The chief permanent feature in the preparation of the land for irrigation by the prevailing method is a network of so-called "four-foot ditches." The name indicates their approximate width and depth. They are usually made by machine. They receive water directly from the floodgates, siphons and pumps.

"Spud ditches" are 10 inches wide, with vertical sides, and usually from 18 to 24 inches deep. Nearly all irrigated crops of the delta are planted in rows, and the spud ditches are constructed each year, by machine, between the rows after the crop is up. The usual spacing between spud ditches is from 50 to 100 feet. A spud ditch runs from the four-foot ditch on one side of the field to the one on the other side, one of the four-foot ditches serving to supply water to the spud ditches and the other to receive the drainage from them. The four-foot ditch which carries drainage from the field on one side of it may, and quite commonly does, carry supply for the field on the other side of it. The water is held up to the desired level in all ditches by means of various primitive forms of temporary dams, with holes or notches in them of size to permit the necessary or desired rate of flow past them.

The admission of water to the spud ditches is followed by a rise of the water table in the field, to the height considered best for the welfare of the crop. For some crops, such as celery, the water table is brought almost to the surface of the ground. For other crops, also, it is maintained at a much higher level than would be approved in other parts of the irrigated region of the United States.

PLATE 10—Celery on peat lands of Sacramento-San Joaquin Delta.

In this system of subirrigation there is deliberate withdrawal from the channels of a much greater quanity of water than is required to meet the demands of evaporation from the fields and transpiration from the crops. It seems to be quite generally believed that this is necessary in order to keep the land "sweet." The excess, entering the four-foot ditches, passes either to the next field or to the main drains and thence to the drainage pumps and is restored to the channels.

Relatively little surface irrigation is practiced on the peat lands. Celery nursery beds are flooded, and celery fields are sometimes flooded before planting, and water is sometimes run between rows of early celery to wet the top soil for ridging when the time for that operation arrives before the season's rains commence. Winter flooding has been used to kill centipedes in asparagus fields. Surface irrigation is more commonly applied on the sedimentary lands, chiefly to orchards and alfalfa.

Drainage is calculated to remove the excess waters of irrigation and to prevent the water-logging of the lands during the winter, which is the rainy non-irrigation season. It is practically unversally employed throughout the delta for the latter purpose. There are some on sedimentary lands who do not drain during the irrigation season. The drainage pumps are usually of large size and electrically-driven. The water is led to them through large main drainage canals. (During the rainy season the four-foot ditches operate as tributary drains exclusively.) In one enterprise which employs a large siphon or operates the pumping plant as a siphon the main drains serve as main irrigation canals during the dry season. This requires booster pumps to get the water up into the four-foot ditches or onto the surface of the ground, as the main drains are excavated to considerable depths.

Tables 213 to 217, inclusive, presented earlier in this chapter, set forth in detail the various crops grown under irrigation in the delta, and the acreage of each, and Table 211 apportions the irrigated acreage of each crop as between peat and sedimentary soils.

As an item of special interest note may be made of the great acreage of asparagus. It is claimed that nearly all of the canned asparagus of the world is grown and packed in the Sacramento-San Joaquin Delta.

A large proportion of the delta is owned in large individual and corporate holdings, one concern having about forty thousand acres and others several thousand acres each. These large holdings, up to about seven years ago, were leased largely to Orientals, who, with their low standards of living and with the dominance of the abler members of the respective nationalities over those of inferior ability or position, were able to operate the lands with profit to themselves and to the owners. At about that time the State of California enacted an anti-alien lease law which compelled a change in the method of operation. A large part of the labor is still performed by Orientals, working either directly for the owners of the lands or for lessees, of either European or Asiatic extraction, who are citizens. Mexican labor is also employed extensively.

There are few or no permanently established white residents on the peat lands in the heart of the delta. On the other hand, attractive and even luxurious homes are found on the sedimentary lands along the Sacramento River and its channels between Sacramento and Rio Vista. This is chiefly a fruit-growing region and includes one of the most noted Bartlett pear districts of the country. The only considerable towns well within the delta are Sacramento River ports.

The initial movement to market of the crops of the delta is in large part by water. Potatoes, onions, beans, sugar beets, alfalfa, barley, corn, celery, fresh asparagus and fruit are hauled from the fields to

the levees and there loaded on various kinds and conditions of craft, to be taken either to local railway stations or to the city ports, including Sacramento, Stockton, San Francisco and the East Bay cities. The fruit and vegetable packing plants in the delta are located in some instances where water transportation only is directly available. In others they have both rail and water at hand. The heart of the delta, including the deeper peat lands, lacks in roads and bridges, although considerable improvement in this respect has been made of late. Even now, a few of the islands are inaccessible except by water. Ferrying is still resorted to in reaching a majority of them by land vehicle. For all except short distances, land travel in the deep peat lands follows the crowns of the levees. In the rainy season the peat trails become undependable or impassable, and the levee crowns, unless gravelled, are treacherous for automobiles. Two principal paved highways traverse outlying portions of the delta: the Victory Highway, from the Antioch Bridge via Sherman Island, and Rio Vista and other Sacramento River towns, to Sacramento, and the Borden Highway, from a point between Brentwood and Byron to Stockton. By the former of these routes one may travel in from three to four hours by automobile from the Bay cities to Sacramento through the delta, and similarly and in about an hour less time by the other from the Bay cities to Stockton. The Santa Fe and the Southern Pacific railways penetrate or traverse the delta to some extent, and the Western Pacific serves along the east margin and to Terminous. For the products of the delta there is no lack of water transportation.

It strikes the observer that farming methods continue to show Oriental influence to an undue extent. There are indications that the present may be a period of transition or reform in agricultural methods and practice. A few notable examples, on a large scale, have been set, to show the greatly increased profit resulting from breaking away from the methods of the past. The world's record, approximately 1000 bushels, for yield of potatoes on an acre of ground, has been obtained on fertilized peat land of the delta, farmed intelligently and intensively. One concern, at least, has practically achieved the new industrial farming, and others approach it. On the other hand, there are still those, some of them large operators, who hesitate to reform their habitual methods or those of their tenants and employees. In view of the generally progressive spirit which must have prevailed in order to bring the delta to its present status of reclamation in the face of problems which were unique and unsolved, it is to be believed that the present apparent sluggishness is only temporary; the result, perhaps, of the prevalent discouraged and protesting attitude of the American farmer generally, and of the reduced financial status of many of the owners, both individual and corporate.

There is a distinct challenge in some of the conditions which obtain in the delta. It seems to offer a most favorable habitat for some of the most persistent and troublesome weeds. The price of their effective eradication is continued and intelligently directed work to that end. So with animal pests. A nematode known locally as "eel worm" has obtained a foothold at various points. Of the delta crops, the potato is the one most destructively affected by this pest. Infested ground will not produce a marketable potato and must be abandoned,

so far as that crop is concerned, for a greater or less length of time. The expedient of burning off a few inches of top soil of fields of the peat areas has been tried. This is sometimes quite effective in cleaning the ground of weeds, but in the instances known to the writer it does not prevail against the eel worm. Burning destroys the top layer of the soil, lowers the elevation of the lands surface, and repeated a sufficient number of times must destroy the land. A commercially practicable method of destroying the eel worm in fields, which will not be attended by any such offset disadvantage, is earnestly sought and if found will be of great value.

The delta owners and operators have to contend with the alkali evil also. It is not known that any adequate local study has been made of this problem; what the alkalies are, their source, distribution and strength of concentration in the soil, effect on soils and crops, palliatives or remedies. Much more must be known concerning these points before assured proceeding to the correction of the evil will be possible.

The advance of sea water into the delta has become a prominent subject of discussion and investigation. Each year, with the approach of the season of low water in the rivers, any particular degree of salinity will be found farther and farther upstream in the deltaic channels. In some recent dry years the limit of salt content considered permissible in waters for irrigation has been found to extend well into the delta and has been responsible for the suspension of late irrigation of lands which derive their water supply from the affected channels.

A striking fact in connection with the delta is that, except to those who have had to do with it in one way or another, it is unknown in comparison with other productive regions of California. Even to a vast majority of Californians it is *terra incognita*. This in spite of its considerable area, of its having been the scene of a large activity in reclamation, of its achieved production and of its further great possibilities. In undertaking to account for this we first take note of the relative inaccessibility of much of the region for ordinary vehicular traffic. Further, the chief spectacular feature which attaches has to do with magnitude only, and the interest of actual and potential tourists is not aroused by vegetable farming, even on a grand scale, to the extent that it is by citrus groves, peach orchards, raisin vineyards, fig gardens and the like.

Locations of Investigations.

In seeking for a location for the investigations on peat lands of the delta it was thought that the best control for the work would be secured if one of the smaller islands, all under one ownership and farmed by a single operator, were selected. Medford Island, containing about 1200 acres, situated about eleven miles west and five miles north of Stockton, conforms to the requirements noted, and work was carried on there for the first two years of the project. It was then decided that the disadvantages of that location, including absence of living accommodations and the consequent time lost in traveling by boat between the island and the nearest available living quarters, outweighed the advantages. Work had been begun in 1925 on King Island, and in 1926 all of the work on peat lands was located there. King Island

has an area of about 3300 acres. Its southeast corner is about seven miles west and six miles north of Stockton. It is reached at a point on its east side by a drive of about thirteen miles from Stockton. Investigations there have continued to date. The large and increasing area devoted to asparagus, on the peat as well as on the sedimentary lands of the delta, indicated the importance of a knowledge of the consumptive use of water by that crop, none of which is grown on King Island. Accordingly, in 1927, investigation to this end was begun on an asparagus ranch of the Richmond-Chase Company on peat land in Reclamation District No. 548, at a point about three miles east of Terminous, about seven miles west and twelve miles north of Stockton. This work is still in progress.

All of the intensive investigations on the sedimentary lands of the delta have been conducted in the Lower Unit of Reclamation District No. 999. They were inaugurated in 1924 and have covered the entire area of the tract named above, amounting to about 22,000 acres. This area, with a length from north to south amounting to about eleven miles, is bounded on the south by Miner Slough, on the east by Sutter and Elk sloughs, on the north by Winchester Lake and artificial channels and on the west by the West Levee and Borrow Pit which were constructed in the process of reclaiming the district. The northeast corner of the tract lies against the town of Clarksburg on the Sacramento River. Facilities for work of the nature required to be done were here in every respect exceptionally good. It was therefore possible to make such progress that it appeared at the close of the season of 1927 that the primary objective, the determination of the consumptive use of water on the area under investigation, had been rather closely approximated, and that full-scale operations would not be necessary henceforth unless some important change in the conditions affecting use of water should ensue. The work on sedimentary lands was therefore suspended indefinitely, with the exception of some incidental investigations designed to narrow the range of uncertainty attaching to the present tentative estimate of the amount of water reaching the area by way of underground paths.

Methods Employed in Investigations on Peat Lands.

The nature of the work and its division into investigations on peat lands and investigations on sedimentary lands required for each of the divisions the full time of one qualified man, resident on the subject area. Lloyd N. Brown was assigned to the peat lands at the inception of the undertaking in 1924, and his responsibility is still current.

In 1924 at Medford Island it was undertaken to measure all of the water admitted to the island and all that was drained from it and pumped back into the channels. Water was withdrawn from the channels by means of twelve small siphons of the type which has been described. Owing to the rise and fall of the tide in the channels the flow through the siphons took place at a continuously varying rate. It was necessary, therefore, to provide for a continuous record of the rate of delivery at each siphon. This was done by installing either a weir or a submerged orifice at the outlet of the siphon and setting water-stage registers—one in the case of a weir and two in the case of a submerged orifice—to obtain a continuous record of the head on the

weir or orifice. The weir, on the score of both accuracy and convenience, is the preferable device, and orifices were used only where the head available was not sufficient for the weir measurement. It is thus obvious that the determination of the amount of water admitted to an area of the size of an entire island by means of a multitude of small siphons involves a considerable amount of labor and expense to provide measuring devices, and a large amount of time for subsequent attendance on them. The water drained from Medford Island is returned to the channel by means of a pump on the south side of the island. A record was kept of the number of hours that pumping was in progress, and the rate of pumping was determined by means of a Collins flow indicator applied to the suction pipes. These two factors served for the computation of the amount of water discharged by the pump. The net amount of water applied in irrigation in any period of time was taken as the difference between the amount of water admitted through the siphons and the amount pumped from the mouth of the main drainage ditch.

Only a minor fraction of the area of Medford Island was irrigated in 1925, the greater part of the island being in barley. A record was kept of the amount of water admitted to and drained from a field of potatoes. The measurement of the water was effected by means of weirs and water-stage registers set on the boundary of the field.

At the close of the season of 1924 it was evident that the investigations must take account of water supplied to crops from underground, in addition to that applied in irrigation on the surface. As one feature of the attack on this problem it was decided to grow crop plants in large galvanized iron tanks, so that all of the water applied and used could be measured. Twelve such tanks were used with barley on Medford Island in 1925. As this device was used at other places also, its design and the manner of using it will be described hereinafter. The Slichter apparatus* was used in some unsuccessful attempts to detect and measure the seepage of water under the levee from the channel to the island. Water-stage registers set over open wells near the levee revealed that the elevation of the water table responded in small degree to the elevation of the water surface in the channel.

The first investigations at King Island were begun in 1925, when sixteen tanks were installed and arrangements were made to determine the net amount of water applied to certain fields. In 1926 the number of tanks was increased to twenty-eight. The measurement of water as it was admitted to the fields and as it drained from them was made by means of weirs and water-stage registers. There has been in all cases enough head so that resort to submerged orifices has not been necessary. Water is diverted from a four-foot ditch at the upper end of the field through one or more openings to a specially constructed head ditch, from which it flows into the spud ditches. Weirs and registers are placed so as to obtain a measurement of the water as it flows from the four-foot ditch to the head ditch. The spud ditches deliver their excess water to a tail ditch at the lower side of the field, and thence the flow is through one or more openings, each equipped with weir and register, into a four-foot ditch. Thus the data for the

* An electrical device designed and used by Professor C. S. Slichter for measuring the rate of movement of ground water, and described by him in Water Supply Paper No. 140, U. S. Geological Survey.

computation of the net amount of water applied to the field are obtained. The Slichter apparatus was tried—again without success—on King Island. In the later efforts to evaluate the ground water contribution to consumptive use a vertical probe has been used, designed to register the hydrostatic pressure of the ground water at depths of five and ten feet below the surface of the ground and thus afford an indication of the direction and velocity of the ground water movement, especially as to whether its direction includes an upward component. Observations have also been made of the gradient of the water table, and note has been made of crop behavior and effects which may be attributed to ground water movement.

The investigation to determine the use of water by asparagus on the Richmond-Chase ranch centers in a battery of twelve tanks in which nursery plants were set in 1927. The company maintains observation of the elevation of the water table on a considerable area, and the record is available for these investigations. The asparagus fields on this ranch have not been irrigated since 1926, so that the determination of field use, which still remains to be made, must be based on a study of depletion of ground storage, possibly supplemented by seepage.

Methods Employed in Investigations on Sedimentary Lands.

The resident work of the first season, 1924, on sedimentary lands, was done by A. M. Wells. He was succeeded in 1925 by Frank Davis, whose responsibility continued until reports for the season of 1927 were submitted, when full-scale work was suspended.

Plate 11 is a sketch map, as of the season of 1926, showing the locations of the various inlets through which water for irrigation is admitted to the Lower Unit of Reclamation District No. 999, together with the principal channels used for the conveyance of water. Pumping Station No. 10, situated on the west side of Elk Slough, about three and one-half miles southerly from Clarksburg, operates as a drainage pump during the nonirrigation season. During the irrigation season the flow may be reversed, and the discharge and suction pipes of a pump operate together as a siphon to deliver water for irrigation. The drainage channels then come into service to carry the irrigation water, which is lifted by booster pumps at various points onto the land. In 1925 a 60-inch steel siphon was installed to carry the water over the levee at this point. The capacity of this siphon is great enough to carry the greater part of the water required to be diverted at this point, so that the use of the pumps as siphons has been greatly reduced. The attendant at the station keeps, as a part of the regular procedure and independently of these investigations, a record of the time of starting and stopping the flow through each of the inlets above noted. It was necessary to have, in addition to this record, a continuous record of the elevation of the water surface in Elk Slough and in the main drainage canal, since under normal conditions the rate of flow through any one of the inlets will depend simply upon the head, consisting of the difference of these two elevations. The essential records of elevations of water surface were furnished by water-stage registers installed on Elk Slough and the canal. It was found that for periods of greater or less length the siphons operated under vacuum at

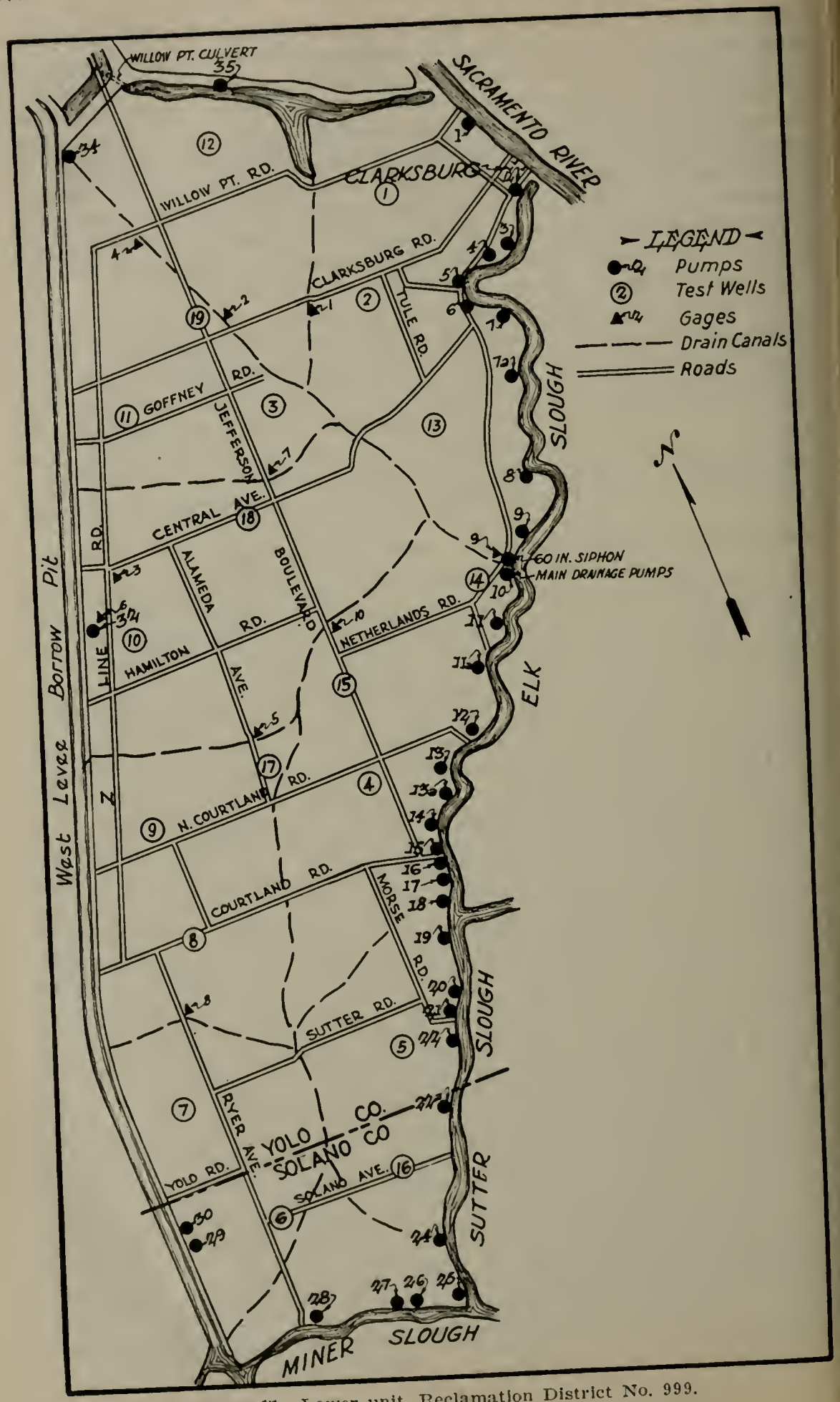


PLATE 11—Lower unit, Reclamation District No. 999.

the summits inadequate to cause them to run full at that point, and that then the rate of discharge was governed not only by the head, as measured by the difference of elevations of water surface in the slough and in the canal, but also by the elevation of the water surface in the slough and the vacuum at the summit of the siphon. A Bristol mercury vacuum gage was therefore installed in the late season of 1925 by the district for the benefit of the investigations. Numerous measurements of the rate of discharge of the siphons under different heads and with partial as well as full vacuum were made in order to determine the relation of the rate of discharge to the observable quantities, head, vacuum and elevation of water surface in the slough. These measurements were made by the color method, with the Collins flow indicator and by gaging with rod floats in the canal. The velocity of the water in the canal was too slow to permit the use of a current meter in gaging. The items which have been noted constitute the data from which the discharge from Elk Slough into the district at this point have been computed.

In order to determine the amount of water pumped into the district by the various district owned and privately owned pumps situated along the levee surrounding the area it was necessary that each be rated and that either the number of hours that it was operated—in the case of pumps driven by engines—or the power consumed—in the case of electricially operated pumps—be ascertained. The water measurements essential to the rating of the pumps were made by measurement over weirs, through orifices, by the color method and with the Collins flow indicator, whichever was possible and most suitable under the conditions encountered. In some cases it was practicable to measure by two methods, and check the results of the one against the other.

Willow Point culvert was the only additional inlet for irrigation water. It was rated by the color method, taking account not only of the head which produced the flow, but also of the varying gate openings.

The only water removed from the area during the irrigation season was a relatively small amount pumped in some seasons by Pump No. 35, at the north end of the area. This pump was rated and its seasonal discharge computed in the same manner as the other small pumps.

The elevation of the water table was obtained by observation at intervals of about ten days throughout the irrigation season on wells placed for that purpose at points distributed over the area. The investigations started with eight of these wells and the number was increased to nineteen after the first season. The casings were of galvanized iron, four inches in diameter, ten feet long, perforated for about two feet of the length at the lower end and set about seven feet in the ground.

One item that goes into the summation to constitute consumptive use is the depletion of ground storage in the irrigation season, herein referred to as the ground water decrement. Where the water table is maintained close to the surface of the ground and at a nearly uniform elevation through the growing season, as is frequently the case on the peat lands, this item is not important. On the other hand, where the water table is lower and varies, as in this area, it assumes a magnitude

which demands consideration. The procedure in estimating the ground water decrement was as follows: At a number of points considered to be properly distributed over the area, soil samples were taken at the beginning and at the end of the irrigation season. The vertical distance interval between samples at each point was six inches, and the sampling extended to a depth to include one sample below the water table. Then with the determination of the moisture content of the samples the data were complete for a vertical profile of moisture content at the beginning and at the end of the season, from which the ground water decrement at any one of the points of sampling could be calculated. The corresponding value for the entire area was obtained by averaging the values at the points. The arithmetic mean and average obtained by weighing the decrement at each point in proportion to the size of a surrounding area apportioned to it in the one instance, and in the other in proportion to the district acreage of the crop in which the point was located, all gave approximately the same result.

There is reason to believe that the only considerable contribution from seepage to the water supply is that which accomplishes its horizontal movement in a permeable formation which lies at depths of thirty feet and more below the surface of the ground, and then reaches the root zone of plants by seeping vertically upward under the influence of pressure existing in the lower permeable formation. Charts from water-stage registers set over shallow wells several hundred feet from the West Levee show the tides in miniature, those taken at the nearer wells showing, naturally, on the larger scale and more distinctly. Probes put down at a dozen or so points over the area generally show that there is an upward component to the movement of the ground water between the depths of ten and five feet from the surface of the ground. It will be undertaken to determine the transmission coefficient* of the soil between the depth of ten and five feet at the probes, and then an indication of the rate of transmission of water in an upward direction will be obtained by multiplying one-fifth of the coefficient by the distance that the water surface in the ten-foot probe stands higher than in the five-foot probe.

A tentative estimate of the seepage contribution to the entire area was made for the period from October 2, 1926, to March 21, 1927, taking it as the amount by which the sum of drainage water removed by pumping, the ground water increment and the estimated loss from water and ground surfaces exceeded the rainfall. The rate of seepage thus estimated was then applied to the irrigation season. Another similarly tentative estimate was made by assigning to each crop and its acreage the water requirements as indicated by the best obtainable data, including the tank work of these investigations, summing up these requirements, adding evaporation from the considerable area of water surface in the tract, and subtracting the sum of the determined elements of water supply, namely: water diverted from the channels,

* For the purposes of this work the transmission coefficient of the soil is defined as the quantity of water, measured in cubic feet, that is transmitted in one day of 24 hours through a prism of the soil one foot in length and one square foot in cross-section, under a difference in head of one foot of water at the ends of the prism. This is equivalent to 1440 times the k of Slichter's discussion in U. S. G. S. Water Supply Paper No. 140.

the ground water decrement and rainfall. The agreement of the two estimates was satisfactory.

Early in the season of 1926 the twelve soil tanks which had been used on Medford Island were taken up and removed to the Lower Unit of Reclamation District No. 999, where they were set up and used in the regular manner throughout that season and the next, and in somewhat casual fashion in 1928. At present (1929) they contain transplanted tules and cat tails under observation for the purpose of gaining some idea as to the use of water by aquatic plants.

Tanks.

The photographs of Plate 12 show the construction and methods of installation for the galvanized iron soil tanks to which reference has been previously made. They consist each of two circular cylinders, one inside of the other. The outer cylinder is water-tight and the inner one contains the soil. The supply of water to meet plant requirements and evaporation from the soil surface is measured into the annual space between the two cylinders and enters the soil through perforations in the bottom and for a short distance up the sides of the inner cylinder. The perforated bottom is detachable and is held in place by means of long rods which pass through holes in the angle-iron collar riveted on the outside of the top of the inner cylinder. The outstanding leg of the angle extends over the top edge of the outer cylinder and thus supports the inner one, whose length is slightly less than that of the outer one. For twenty-eight of the tanks the inner cylinder area is 2.90 square feet so that the soil surface in fifteen thousand of these tanks would amount to one acre. The asparagus tanks in service on the Richmond-Chase ranch are five feet long and the area of soil presented by one tank is 9.28 square feet. The soil area in 4694 of these tanks would amount to one acre. In 1926 twelve tanks which had been used at the experiment station at Davis were renovated and remodeled and set on King Island. They are about four feet long, and the soil area presented by each is 3.98 square feet, corresponding to 10,945 tanks to the acre.

The method used in filling the inner cylinder with soil is designed to accomplish this end with the least possible disturbance of the soil, so that it will rest in the tank in the same condition as when in place in the field. The cylinder, with its detachable bottom removed, is set on the ground and forced down through the soil to a depth equal to its full length. An excavation is then made around it and the soil core is cut through at the lower edge of the cylinder and the bottom of the cylinder replaced. Then the cylinder is lifted, the outer cylinder set in the excavation and the inner cylinder, full of soil, lowered into it and the excavation back-filled. Some of the cylinders are not quite completely filled when they have been forced their full length into the soil, thus indicating a slight degree of compaction in the process. In forcing the cylinder down, a platform about ten feet long and of width a little greater than the diameter of the cylinder was set on top of it and bolted to it through holes in the outstanding leg of the angle-iron collar. In the peat, two men, one at each end of the platform, would revolve it through a small arc, applying at the same time a good part of their own weight. This would put the cylinder about half

Inner and outer parts of asparagus tanks ready for installation.

Pressing the inner tank into the soil.

Excavation around inner tanks so that bottoms may be bolted on and the whole lifted inside the outer tanks.

Tanks installed and planted. Evaporation tank in foreground.

PLATE 12—Soil tanks as used in the delta investigations.

way down, and then two or three sacks of earth would be loaded on the platform and the operation completed. In the case of the sedimentary soils a much greater insistent weight was found necessary, amounting to more than two tons, and a slight teetering motion imparted to the platform was found to be more effective than turning back and forth about a vertical axis.

Crop plants are grown in the tanks, and at least a small area of ground surrounding them is planted to the same crop in order that the tank plants may grow under conditions of exposure the same as field plants. The number of plants in a tank is regulated so that each one has about the same area apportioned to it as if it were growing in the field.

Water in the annular space between the tank cylinders is kept at the elevation desired for the water table in the soil in the inner cylinder. Attention on this score is required at varying intervals of time—normally once or twice a week in the height of the growing season. Readings of the elevation of the water surface in the annular space are made just before and just after each addition of water. These readings, together with the amount of water added and a figure for the amount of water necessary to be added to or drained from the soil to raise or lower the water table any given small amount, constitute the data for the computation of the loss of water from the tank for any period of time between observations. This does not take account of any change that may have taken place in the moisture content of the soil above the water table. In the latter work this factor has been included in computation of the use of water for the entire season, the value accorded it being that determined from soil samples taken in the area outside the tanks, since sampling inside the tanks would impair the soil arrangement which pains have been taken to maintain. With a view to minimizing change of moisture content above the water table, the general practice has been to bring the water table at the close of observations for the season to the same elevation that it was when the observations were begun. Friction tape and asphalt paint are used to seal over the annular space so that there is no loss of water from the tank except by transpiration from the plants and evaporation from the soil surface.

In 1925, the first year of use of tanks, four of those at King Island were fitted with flat conical covers, and the plant protruded through a swathing of cotton in a hole at the vertex of the cone. The object of this was to confine the tank loss to transpiration and thus to segregate it from evaporation at the soil surface. Four other tanks were kept bare, but were shaded by plants growing outside the tanks. It was found that variations in the vigor of the individual plants in this instance were so great that no conclusions could be drawn. Moreover, on reflection, it appears probable that the sum of the losses from a tank where transpiration alone was permitted and one from which evaporation was the only loss would not be the same as from a single tank subject to loss of water from both causes.

There are only two respects in which it is recognized that field conditions for the growth of plants are not completely duplicated in the tanks. One is the slight compaction of the soil which took place in some of the tanks when they were put down, and the other is that

TABLE 218

FIELD IRRIGATION OF POTATOES ON PEAT LANDS

Item No.	Year	Location	Area of field acres	Irrigation season			Irrigation water used per acre			Yield, sacks per acre
				First day	Last day	Length, days	Admitted acre-feet	Drained, acre-feet	Net, acre-feet	
[1]1	1924	Medford Island	1,100	About June 1	Aug. 19	80	1.45	1.27	0.18	----------
2	1925	Medford Island	93.55	May 26	July 16	51	5.07	4.82	0.25	[5]60–70
3	1925	Kings Island	21.97	July 30	Oct. 9	72	2.75	2.05	0.70	118
4	1926	King Island	[3]11.84	May 29	Sept. 1	96	6.48	3.10	3.38	142
5	1926	King Island	18.38	Late May	Early Sept.	100	5.32	2.14	3.18	193
6	1927	King Island	[4]18.63	June 17	Aug. 9	54	2.48	1.02	1.46	[5]32

[1] An estimate for an irrigation season of 80 days, based on the record obtained for a part of the irrigation season, from July 4 to August 19, 47 days, during which period the water admitted for irrigation amounted to 940 acre-feet, and that drained off to 824 acre-feet.

[2] Approximate. Not uniform over the field. One area of about six acres is said to have yielded nearly 300 sacks per acre.

[3] A part of 21.97 acre field used in 1925.

[4] Practically the same ground as the 18.38 acre field used in 1926.

[5] The crop was rated a failure.

there is presumably a continual circulation of the ground water in the field, whereas it is nearly stagnant in the tanks during the nonirrigation season and perhaps during the irrigation season less active than in the field.

As an incident to the operation of the tanks there has been some opportunity to observe certain characteristics of the soils involved, notably the free water capacity and the transmission coefficient.

Experiments with Various Crops.

In the immediately following paragraphs a review will be given of the experiments with each crop which has in any measure been treated separately from others. Consideration will be given to field and tank

PLATE 13—Potato tanks at time of harvest, September 30, 1926. Reclamation District No. 999.

experiments on both peat and sedimentary soils. Attendant facts recognized as pertinent will be presented. Certain conclusions reached by the writer from a study of results and conditions and in conference with his associates in the investigations will also be submitted.

Potatoes

In 1926 records were made of the water applied to two fields of potatoes on sedimentary lands in Reclamation District No. 999, near Clarksburg. The soil is of the somewhat heavy type which is prevalent in much of the lower unit of the district. Water was applied in spud ditches and none was drained off. The results were manifestly not representative in either case. The land was farmed by Chinese, and more water was applied than was necessary to produce a crop—in one case 4.14 acre-feet and in the other 4.80 acre-feet per acre. No field of

potatoes was found available in later years on which to repeat the experiment under more favorable conditions.

Table 218 presents a summary of field experiments on potatoes grown in peat. Practically continuous subirrigation was practiced, and the net amount of water appplied was calculated as the difference between the amounts admitted to and drained from the spud ditches.

The small fractions of an acre-foot per acre, representing the net water applied in irrigation in items 1 and 2 of Table 218, is taken as indicating that a large amount, almost if not quite sufficient for the needs of the crop, reached the Medford Island fields by underground paths and that whatever of benefit resulted from irrigation operations must have been of the nature of an even distribution of the water. That is to say, the irrigation works, together with the drainage, served as a regulator rather than as an instrument of supply. Undeground movement of water into or out of the fields must be invoked to explain apparent inconsistencies in the net irrigation for the remaining items of the table, also. In a subsequent paragraph the data will be examined in the light of the results of experiments on potatoes grown in tanks, as set forth in Table 219.

TABLE 219

USE OF WATER BY POTATOES GROWN IN TANKS

Location	Year	Tank No.	Water used per acre, acre-feet	Weight of tubers per acre, pounds	Remarks
King Island	1925	5	0.61	----------	Tanks 5, 6, 8 and 14 were bare, but became shaded by adjacent plants
		6	0.49	----------	
		8	0.55	----------	
		14	0.55	----------	
King Island	1925	2	2.62	39,532	Tanks 2, 9, 12 and 16 were covered in a manner calculated to permit transpiration and at the same time to prevent evaporation from the soil surface
		9	1.95	30,002	
		12	0.98	24,685	
		16	0.78	17,479	
King Island	1925	1	2.08	5,608	Tanks 1, 4, 10 and 13 were irrigated with water from the irrigation ditches
		4	1.32	28,548	
		10	1.35	24,894	
		13	1.15	21,272	
King Island	1925	3	1.81	21,014	Tanks 3, 7, 11 and 15 were irrigated with water from the main drain on Medford Island
		7	1.32	24,381	
		11	1.42	22,017	
		15	1.09	17,207	
King Island	1926	1	1.02	4,830	The potatoes in tanks at King Island in 1926 were attacked by nematodes during period of growth; hence the low yields
		2	0.82	4,370	
		3	0.86	3,274	
		4	0.94	4,826	
		5	0.86	4,128	
		6	0.77	5,803	
		7	0.81	5,786	
		8	0.79	6,432	
Reclamation Dist. 999	1926	1	2.30	31,342	----------
		2	2.45	34,880	
		3	2.05	43,456	
		4	2.07	34,937	
		5	1.08	16,902	
		6	1.63	29,495	

In all of the work listed in Table 219 the tanks were set in potato fields and the field plants grew close to the tanks, so that when a good growth had been made it was impossible to distinguish field plants

from those in the tanks until the observer was within a few feet of them. The water table in the tanks was regulated so as to stand at approximately the same elevation as in the field—about two feet below the ground surface at the beginning of the growing season, about a foot higher than that in early midseason, falling again to two feet toward the end of the period of growth and finally still lower. At King Island in 1925 the potatoes were planted on May 14 in the twelve tanks and in the immediately adjoining portion of the field. The field as a whole was planted about ten days earlier. The period of observation extended from the date of planting to October 26. The potatoes in the field were dug early in September and made a marketable crop. Those in the tanks, however, were not removed until about the close of the period of observation, at which time it was found that nematodes had destroyed a good many of them. In order to

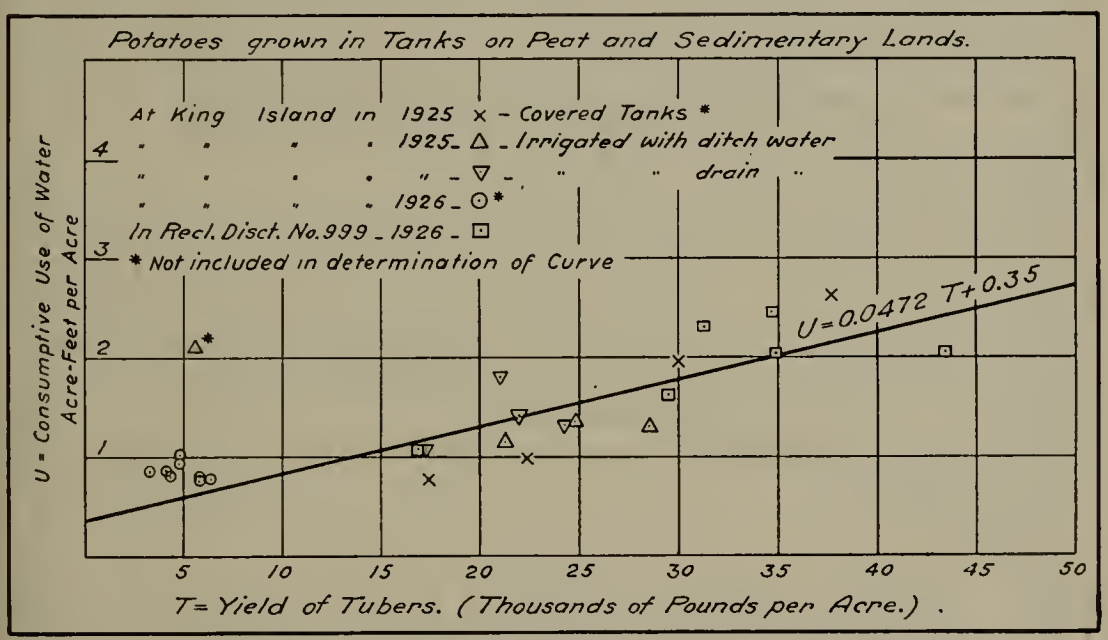


PLATE 14—Relation of consumptive use of water to yield for potatoes grown in tanks on peat and sedimentary lands.

make an estimate of the yield it was necessary to replace the damaged tubers by sound ones of the same shape and size. It is believed that the resulting percentage of error in the estimated yields is very small. In 1926 on King Island the nematodes attacked the tank potatoes rather early in their period of growth, so that development was arrested, the irrigation season was shortened to about fifty days, and only a small yield was returned. There were no untoward circumstances to be taken into account in reviewing the tank experiments in Reclamation District No. 999 in 1926. The planting was done on May 10 and the potatoes were dug 143 days thereafter. Irrigation was begun on June 9 and the last addition of water to the annular space in the tanks was made on August 31.

On Plate 14, with data taken from Table 219 a point has been plotted for each of the tanks in which potatoes were grown. T(= yield of tubers in thousands of pounds per acre) has been taken as abscissas, and U(= consumptive use of water in acre-feet per acre) as ordinates. The plotting makes apparent an approximate general

linear arrangement of the points corresponding to the various tanks. The greatest departure from this relation is in the case of tank No. 1 at King Island in 1925. The plant in this tank was abnormal as compared with all of the others, since it produced by far the greatest weight of vine of any of the plants at the same time that the weight of tubers produced was near the minimum. The ratio of weight of tubers to weight of dry vines was only 0.6, whereas it ranged in the other tanks from 3.2 to 9.1, and averaged 6.2.

The inclined line on Plate 14 is defined by the equation

$$U = 0.0472\ T + 0.35$$

This equation is the result of an adjustment, by least squares, to the points representing tanks Nos. 4, 10, 13, 3, 7, 11 and 15 at King Island in 1925 and tanks Nos 1 to 6, inclusive, in Reclamation District No. 999 in 1926, a total of 13 of the 26 potato tanks listed in Table 219. In deriving the equation, tank No. 1 at King Island in 1925 was

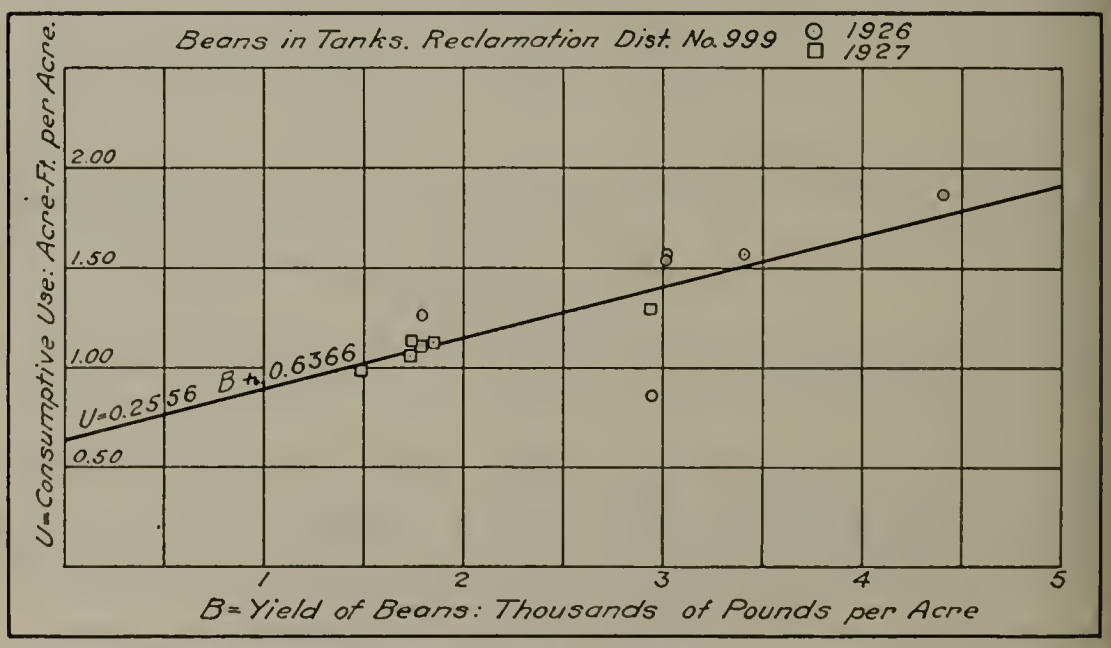


PLATE 15—Relation of consumptive use of water to yield for beans grown in tanks.

omitted from consideration for the reasons which have been stated above; and because normal results could not be assumed in those cases, no account was taken of the covered tanks nor of the King Island tanks in 1926. It appears, however, that the position of the adjusted line would not have been materially different if the two groups of tanks just mentioned had been included in the consideration.

Following the account of the results of tank experiments with other crops there will be examined and submitted a suggestion for the use of the yield-use equations in employing normal average yields for the estimation of consumptive use in a region.

Beans

Both field and tank experiments with beans have been confined thus far to sedimentary soil in Reclamation District No. 999. The water applied to an 81-acre field was determined in 1926. The soil of

the field is the heavier or clayey type of the locality. Water pumped on the field amounted to 0.75 acre-feet per acre. The moisture taken from the soil, as computed from soil samples taken at the beginning and at the end of the irrigation season was 0.20 acre-feet per acre. The total determined use was therefore 0.95 acre-feet per acre. The yield was not reported. Observations were repeated in 1927 on 55 acres of the same field. The total amount of water applied to the field, the groundwater decrement and the total determined use, respectively, amounted to 0.71, 0.29 and 1.00 acre-feet per acre. The yield was 9.37 sacks per acre. An additional field of 40 acres of beans in the same locality was also observed in 1927. The water pumped amounted to 1.43 acre-feet per acre. Adding ground water decrement, estimated at 0.29 acre-feet per acre, the same as for the 55-acre field in the same year, gives 1.72 acre-feet per acre as the total determined use. The yield was 12 sacks per acre. There was no surface waste from any of the bean fields above noted, and no attempt was made to detect or measure seepage into or out of the fields. Subirrigation, accomplished by means of spud ditches, was the method employed.

Six tanks were used in 1926 and 1927 to determine the use of water by pink beans. In both years the planting was done on June 16 and the beans harvested three and one-half months thereafter. The vines were dry about two weeks before the harvest. The water table in the tanks was maintained at approximately the same depth below the ground surface as that found in the adjoining field of beans. This depth, at semimonthly intervals starting with the date of planting, was 1.6 1.8, 1.95, 1.85, 2.05, 2.10, 2.4 and 2.75 feet respectively in 1926 and 2.2, 2.2, 2.2, 2.4, 2.8, 3.15, 3.4 and 3.6 feet, respectively, in 1927. Table 220 sets forth for each tank in each year the yield of beans, in pounds per acre, and the water used, in acre-feet per acre.

TABLE 220

USE OF WATER BY BEANS GROWN IN TANKS IN RECLAMATION DISTRICT No. 999[1]

Year	Item	Tank No.					
		1	2	3	4	5	6
1926	Yield of beans. Pounds per acre	[2]1,798	2,958	3,018	3,016	4,418	3,418
1926	Water used. Acre-feet per acre	1.26	0.86	1.57	1.53	1.87	1.57
1927	Yield of beans. Pounds per acre	1,486	2,950	1,738	1,791	1,738	1,860
1927	Water used. Acre-feet per acre	0.99	1.29	1.13	1.11	1.06	1.12

[1] Sedimentary soil.
[2] Plants in tank No. 1 in 1926 were injured by pest before maturing.

Plate 15 has been prepared from the data of Table 220 using as abscissas B = yield of beans in thousands of pounds per acre and as ordinates U = use of water in acre-feet per acre, thus giving a point for each tank in each year. It is seen that these points arrange themselves in rather definite linear relation, so that the point representing tank No. 2 in 1926 is the only one which does not lie close to the adjusted line defined by the equation

$$U = 0.2556\ B + 0.6366$$

Sugar Beets

A part of field C-1 at Camp No. 3½ on King Island was selected in 1927 for determining the use of water on sugar beets. The numerical summary is as follows: Area of field, 19.27 acres; length of irrigation season, May 11 to July 10, 61 days; water admitted to the field, 1.54 acre-feet per acre; water drained from the field, 0.40 acre-feet per acre; net irrigation, 1.14 acre-feet per acre; yield, 25.02 tons per acre with an average sugar content of 14.14 per cent. The field on which this crop was grown is adjoined on the north by the 18-acre potato field on which data were secured in 1926 and 1927, and shared with the potato field in the expectation that the deep main drain which interposes between the fields and the channel bounding the island would intercept any seepage coming from the channel.

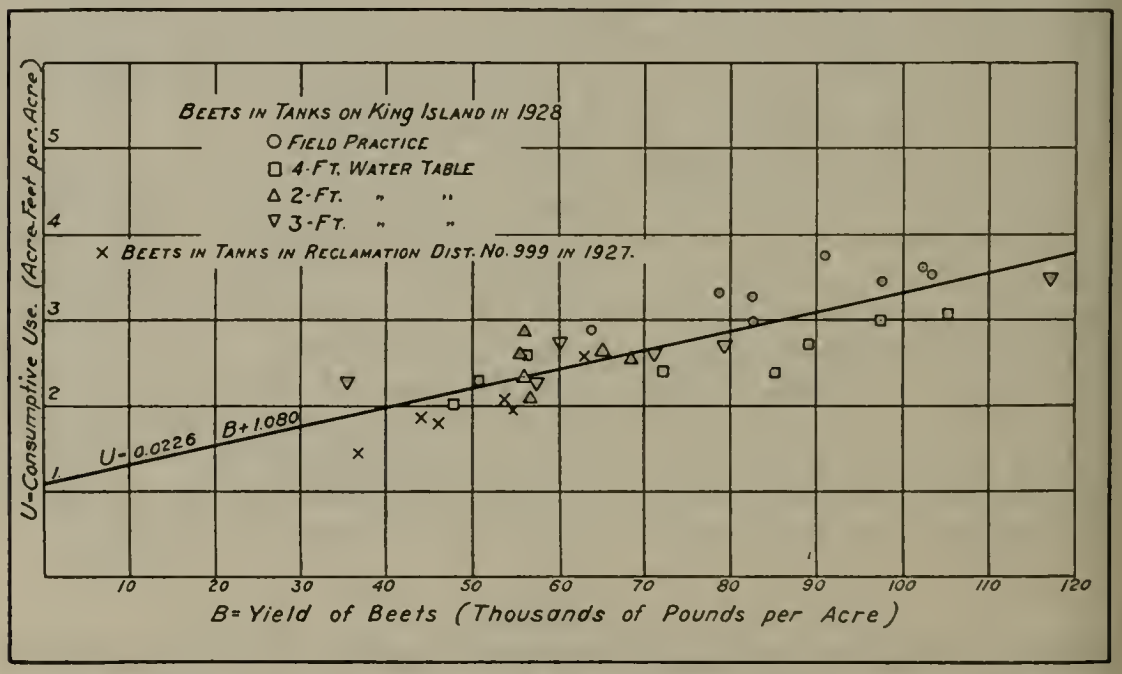


PLATE 16—Relation of consumptive use of water to yield for beets grown in tanks.

A field of 37.9 acres of sugar beets was chosen for water measurements in 1928. The field of 19.27 acres, where the measurements were made in 1927, is a part of this field. The irrigation season lasted from June 5 until July 21, a period of 46 days, in which the measured net use of water was 0.87 acre-feet per acre. The yield of beets was 23.2 tons per acre, with an average sugar content of 12.69 per cent.

The irrigation practice followed in both years was to keep water running through the spud ditches so that the water table in the field was held at about 18 inches below the ground surface. Two or three times in the irrigation season the water was raised in the spud ditches and held there, usually for three or four days, until the water table was within slightly less than a foot of the ground surface. The dams in the spud ditches were then removed and the water table was allowed to fall to its former level. When irrigation was discontinued the water table gradually fell until at harvest time it was 4½ feet below the ground surface. A review which takes account of the circumstances attending the growing of these crops leads to the conclusion that water was used in an amount considerably exceeding that accounted for by

measurements. The beets continued to grow and therefore to use water throughout the period intervening between the end of the irrigation season and the time that they were dug. A considerable growth of weeds developed in this latter period. The beets in an advanced state of growth, together with the weeds, must have used water at a rate at least equal to the mean rate at which the measurements indicate that the beets used it during the irrigation season. Additional use, computed on this basis, brings the total use up to nearly three acre-feet per acre in 1927 and to a little more than 2 acre-feet per acre in 1928.

TABLE 221

USE OF WATER BY SUGAR BEETS GROWN IN TANKS

Location	Year	Tank No.	Water used per acre, acre-feet	Yield of beets per acre, pounds	Remarks
King Island	1928	1	3.33	78,820	Water table as in field practice
		2	3.77	91,030	
		3	3.63	102,290	
		4	3.54	103,250	
		5	3.00	82,5 0	
		6	2.90	63,820	
		7	3.45	97,590	
		8	3.29	82,590	
King Island	1928	9	2.41	85,410	Water table 4 feet below ground surface
		10	3.08	105,100	
		11	2.74	89,150	
		12	3.02	97,590	
		13	2.61	56,310	
		14	2.41	72,260	
		15	2.04	47,870	
		16	2.29	50,680	
King Island	1928	17	2.55	68,480	Water table 2 feet below ground surface
		18	2.63	55,460	
		19	2.66	65,050	
		20	2.10	56,840	
		21	2.86	56,160	
		22	2.34	56,160	
King Island	1928	23	2.62	71,210	Water table 3 feet below ground surface
		24	2.26	57,510	
		25	2.27	35,600	
		26	2.72	79,450	
		27	3.50	117,100	
		28	2.75	60,270	
Reclamation Dist. 999	1927	1	1.87	44,359	Water table as in field practice
		2	1.80	46,345	
		3	2.57	63,062	
		4	1.44	36,904	
		5	1.97	54,650	
		6	2.06	53,747	

Records were kept in 1927 of the irrigation of two fields of sugar beets adjacent to the bean fields which were observed the same year in Reclamation District No. 999. Water was pumped into a head ditch and distributed through spud ditches spaced 80 feet apart. The fields contained 40 and 25 acres, respectively; the amounts of water applied were 1.27 and 1.04 acre-feet per acre; and the yields of beets were 12.05 and 9.31 tons per acre. When the ground water decrement as determined by soil samples is added, the total determined use becomes 1.47 and 1.24 acre-feet per acre, respectively; and adding 0.50 acre-feet per acre, the figure which has been tentatively adopted as representing the seepage contribution, the total consumptive use on the beet fields becomes 1.97 and 1.74 acre-feet per acre, respectively.

Sugar beets were grown in tanks in Reclamation District No. 999 in 1927 and on King Island in 1928. The results are set forth in Table 221 and on Plate 16.

On Plate 16 the abscissas of points are B = yields of beets, in thousands of pounds per acre, and the ordinates are U = use of water, in acre-feet per acre. The inclined line, adjusted to the general approximate linear arrangement of the points, is defined by the equation

$$U = 0.0226\ B + 1.080$$

Celery

Table 222 is a summary of observations on the field irrigation of celery in 1926 and 1927, the only years in which it has been under observation. The location was on peat land at Camp 3½, King Island. Irrigation was accomplished by means of spud ditches.

TABLE 222

FIELD IRRIGATION OF CELERY ON PEAT LANDS

Item No.	Year	Location	Area of field acres	Irrigation season			Net quantity of irrigation water applied per acre, acre-feet[1]	Yield, crates per acre
				First day	Last day	Length, days		
1	1926	King Island	2.18	[2]July 30	[3]Dec. 15		1.10	216
	1927	King Island	16.45	July 26	Oct. 27	94	1.35	234

[1] Difference between quantity admitted to the field and that drained from it.
[2] Date of planting.
[3] Approximate date of harvest.

In 1927 the celery was transplanted from the nursery bed to the field early in July and was harvested early in January, 1928. The irrigation season lasted until the water supplied by rainfall was sufficient for the needs of the crop. Up to the time of harvest this amounted to 6.5 inches. (It was less than this in 1926.) The celery was of high quality.

The net quantity of irrigation water applied, as noted in Table 222, is only one term in the summation to obtain the total requirement of celery. The plants receive frequent irrigations in the nursery beds. However, since under average conditions an acre of nursery will furnish plants for about 20 acres of field, it is not likely that the nursery irrigation amounts to more than 0.1 acre-foot of water for each acre of field. The field is flooded before transplanting is begun, the basin method being employed. It was found that in 1927 about 0.6 acre-foot of water per acre was used in flooding. Water is sometimes run between rows of early celery to wet the top soil for ridging when the time for that operation arrives before the season's rains commence. Seepage, inward or outward, as the case may be, has not been measured or estimated for the fields in question. Ignoring this factor, a total use of from 2 to 2½ acre-feet per acre, including rainfall, is indicated by the field experiments.

The tank experiments with celery began on July 9, 1927, with the setting of plants in eight tanks at Camp 3½ on King Island. The crop was harvested on December 13. All of the plants except one, which was injured by nematodes, made good marketable celery. The use of water, including rainfall, was as shown in Table 223. The use is, throughout the list, less than is consistent with the field experiments unless seepage out of the fields can be invoked to reconcile the two sets of determinations.

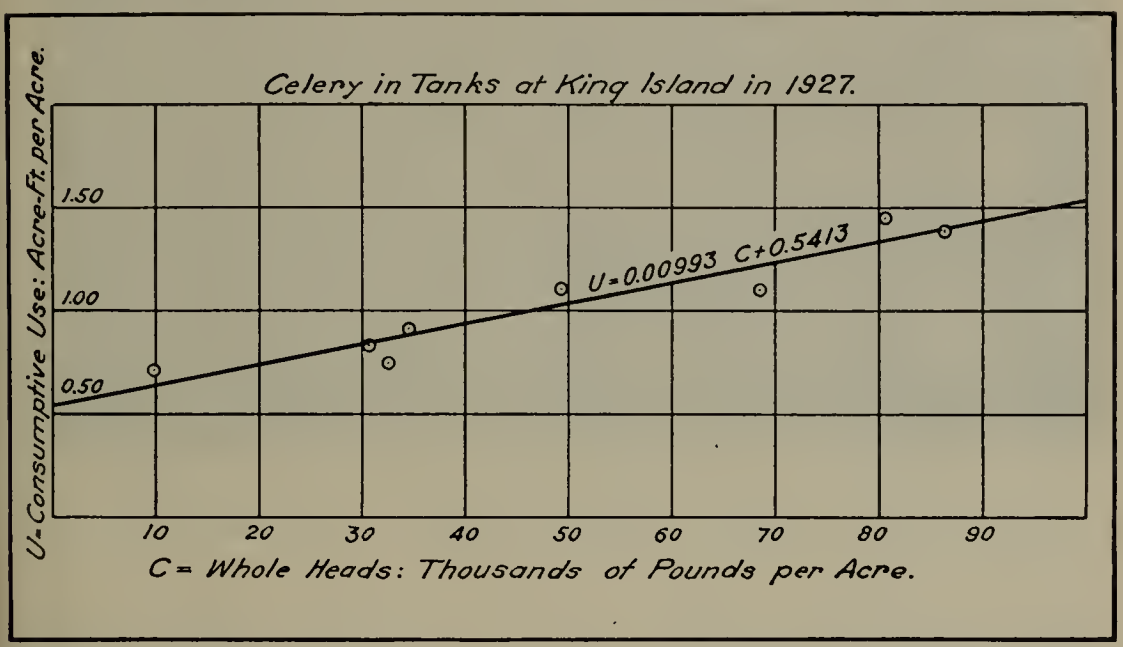


PLATE 17—Relation of consumptive use of water to yield for celery grown in tanks.

TABLE 223

USE OF WATER BY CELERY GROWN IN PEAT SOIL IN TANKS

Tank No.	Use of water per acre, acre-feet	Yield per acre		Number of dozen[1]
		Whole heads, pounds	Trimmed heads, pounds	
1	0.71	9,895	(2)	----------
2	0.83	30,819	13,500	9
3	1.10	49,490	30,306	6
4	0.91	34,626	16,734	8
5	1.10	68,590	35,020	5
6	1.39	86,367	34,411	4½
7	0.74	32,594	14,665	10
8	1.45	80,713	46,398	5

[1] Estimated number of dozen plants that will fill a crate.
[2] Nematodes reduced the vigor of the plant so that it did not attain a marketable size.

The points plotted on Plate 17, one for each tank, have as abscissas C = the yield of whole heads of celery, in thousands of pounds per acre, and as ordinates U = the use of water, in acre-feet per acre. The equation of the inclined line, which has been adjusted to define the general linear relation of the points, is

$$U = 0.00993\ C + 0.54$$

Corn

In 1926 the net use of water applied in irrigation on a field of corn was determined. Field C-4 at Camp 3½, King Island, was selected for

Corn tanks on August 5, 1926, showing close simulation of growth in adjacent field.

Tank crop ready for harvest, September, 1926. The nearby field corn has been cut down for access to tanks.

PLATE 18—Corn tanks—King Island.

the purpose. The numerical data are as follows: area of field, 33.11 acres; length of irrigation season, 123 days—from May 28 to September 27; water admitted to field, 89.681 acre feet; water drained from field, 10.384 acre-feet; net water applied, 79.297 acre-feet, equivalent to an apparent use of 2.40 acre-feet per acre; yield of shelled corn, about 1.44 tons per acre. The yield is considered somewhat better than the average of the region.

The water supply was delivered through the same four-foot ditches as to other and more profitable crops. Consequently, yielding to the demands of these other crops, the water table in the corn field frequently fell to a lower elevation than the irrigators thought it should. The corn, however, did not appear at any time to be in distress. The relatively small amount drained from the field may be taken to indicate that corn may be sueeessfully raised without having so much water run off the field as is the usual custom. The waste water of course has to be pumped out of the island by a drainage pump.

The corn plants in the field were not on the average as vigorous as those grown in the tanks. However, a great many weeds grew in the field and undoubtedly transpired a material portion of the water which was supplied in irrigation.

Corn was planted in 1926 in eight of the tanks at King Island. The date of planting was about a month later than in the field. The corn in tanks and field matured together with the approach of eold weather, so that the irrigation season for the tanks was only about 95 days.

In 1927 three batteries or groups of tanks at King Island were planted to corn in order that the effeets of different heights of water table might be observed. The plan was to hold the water at one, two and three feet below the ground surface in the respective groups. This was done, with but slight modification in the first group. When the corn was planted the water table was down about two feet and was allowed to subside under the influence of evaporation and transpiration until, in accordance with local practice, it was time to start irrigating. This time eame when the corn was about three feet high. The water table was thereupon raised to one foot below the surfaee in the tanks of group I, and a few days afterward the plants showed signs of distress and laek of vigor. Many explanations of this adverse condition were offered, but the eonclusion was finally reached that faulty manipulation of the water table was to blame. The roots had penetrated the soil, probably to the water table, and then were drowned out when the water table was raised to the one-foot level. The water was therefore allowed to stay at about the one-foot level in four of the tanks and was drawn down to two feet in the other four. The lowering of the water table did not bring relief to the plants. Apparently they were not able to recover from the shock that they had received. An apparently similar condition of corn plants has been noted at various times in the delta. The inference is that it is the result of unsuitable manipulation of the water table.

The corn in group II, with the water table held at two feet below the ground surface, and in group III, with the water table at the three-foot level, grew vigorously.

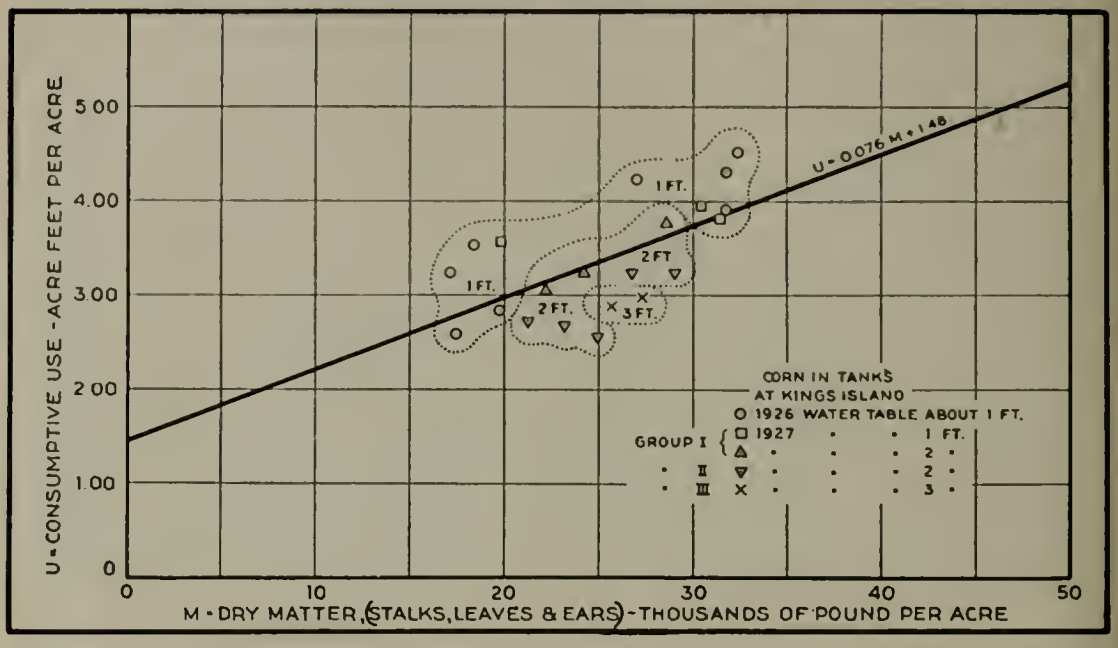


PLATE 19—Relation of consumptive use of water to yield of dry matter (stalks, leaves and ears) for corn grown in tanks.

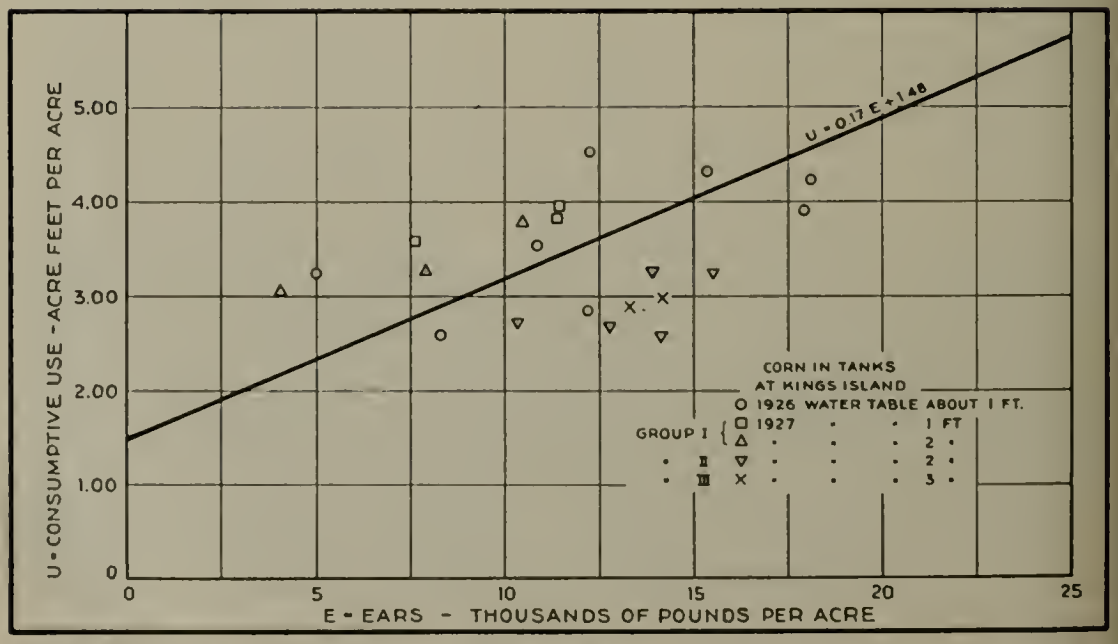


PLATE 20—Relation of consumptive use of water to yield of ears for corn grown in tanks.

TABLE 224

USE OF WATER BY CORN GROWN IN PEAT SOIL IN TANKS

Year and Group	Tank No.	Use of water per acre, acre-feet	Yields per acre		
			Stalks, pounds	Ears, pounds	Ears and stalks, pounds
1926	[1]1	4.51	20,110	12,248	32,358
	2	3.91	13,804	17,926	31,730
	[2]3	2.85	7,514	12,182	19,696
	[2]4	2.59	9,137	8,309	17,446
	5	4.31	16,320	15,360	31,680
	[1]6	3.25	12,116	4,999	17,11
	7	4.23	8,872	18,108	26,980
	8	3.54	7,316	10,874	18,190
1927	1	3.58	12,149	7,597	19,746
	2	3.83	20,749	11,384	32,133
I[3]	3	3.96	18,905	11,470	30,375
	4	3.66	21,868	(4)	----------
	5	3.78	18,065	10,481	28,546
	6	3.26	16,327	7,912	24,239
	7	3.06	18,088	4,058	22,146
	8	3.09	16,681	(4)	----------
II[5]	1	2.69	10,343	12,790	23,133
	2	2.57	10,751	14,136	24,887
	3	3.25	13,450	15,536	28,986
	4	3.26	12,727	13,933	26,660
	5	2.74	10,819	10,343	21,162
	6	2.43	----------	(4)	----------
III[6]	7	2.41	----------	(4)	----------
	8	3.31	----------	(7)	----------
	9	2.90	12,235	13,350	25,585
	10	2.98	13,024	14,203	27,227
	11	3.33	----------	(4)	----------
	12	2.81	----------	(4)	----------

[1] Large plants grew in tanks 1 and 6, but not many kernels of corn set. Pollination difficulties are surmised.
[2] Tanks 3 and 4 had each one stalk of corn in them. Each of the other tanks in 1926 had two stalks of corn in them.
[3] The water table in tanks 1, 2, 3 and 4 was one foot below the ground surface. In the other tanks, Nos. 5, 6, 7 and 8 of Group I, the water table was two feet below the ground surface, except for a few days at the beginning of the irrigation season, when it was brought up to one foot.
[4] Meddlers robbed the plants of ears.
[5] The water table in the tanks Nos. 1 to 6, inclusive, constituting Group II, was maintained two feet below the ground surface.
[6] The water table in tanks Nos. 7 to 12, inclusive, constituting Group III, was maintained three feet below the ground surface.
[7] One ear abortive.

It appears that results as to both use of water and yields were obtained in 21 of the tanks in Table 224. The points plotted on Plate 19—one point for each of the 21 tanks—have as abscissas M = the yield of dry stalks, leaves and ears (roots excluded), in thousands of pounds per acre, and as ordinates U = the corresponding use of water, in acre-feet per acre. The conformity of the points to a linear relation is less striking than in the cases of the tank experiments with other crop plants which have been discussed herein, so that when the adjusted line whose equation is $U = 0.0755\ M + 1.48$ has been deduced and drawn, it is found that for many of the tanks the observed value of U and the value as computed by means of the above equation or as may be seen on Plate 19 differ by a material amount, in six instances by more than one-half of one acre-foot per acre, the maximum residual of this nature being —0.71 acre-foot per acre. Moreover, the grouping of the points, as shown by the three irregular areas outlined on Plate 19 to include the points corresponding to water table at one, two and three feet, respectively, below the ground surface, indicates quite clearly that more water is used to produce a certain weight of stalks

and ears on an acre when the water table is high than when it is low. It is probably true that the general practice in irrigating corn on the peat lands of the delta corresponds more closely to the upper subgroup of points on Plate 19 than it does to the group as a whole. If that is the case, an equation based on the upper subgroup of points may be presumed to be more serviceable than the one which has been given based on the entire group of points. Such an equation for the upper subgroup is $U = 0.0848\ M + 1.58$.

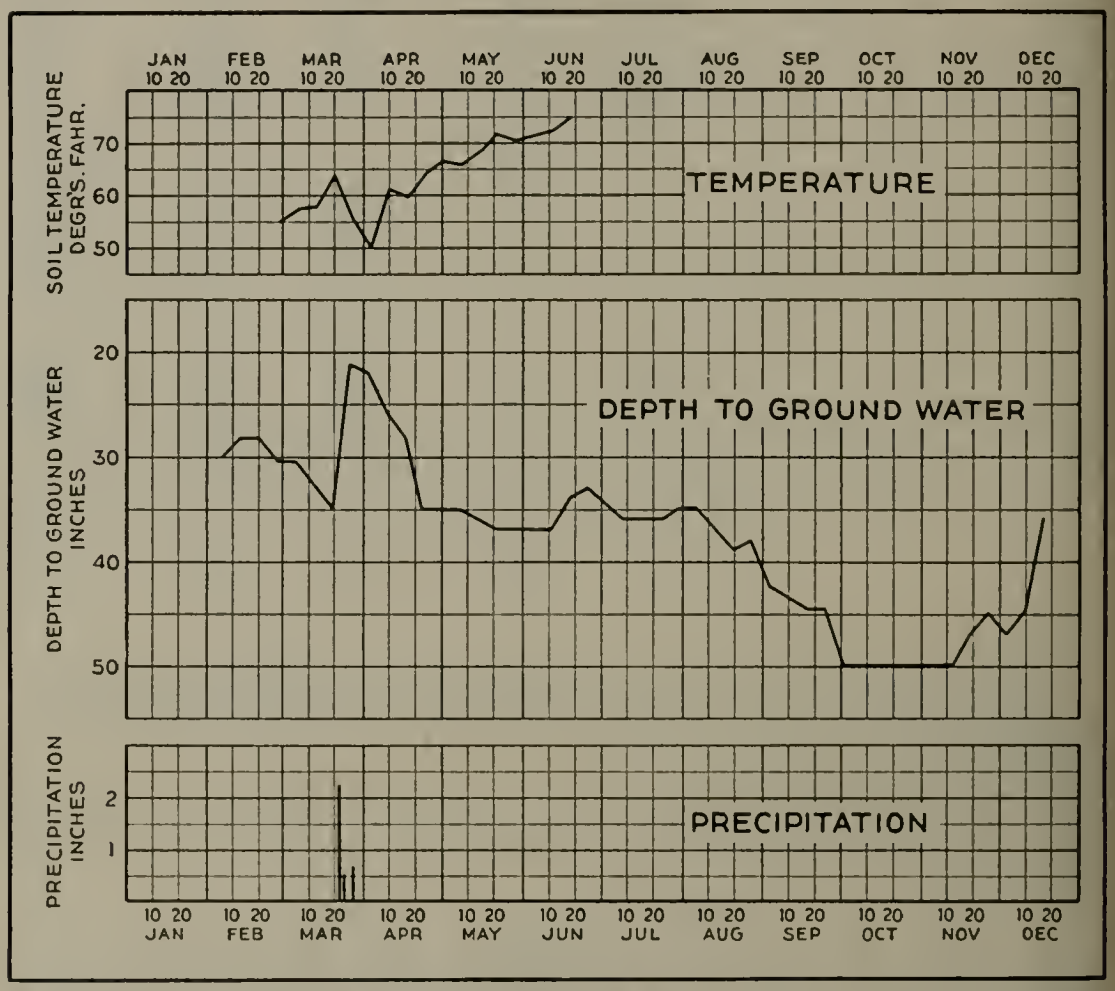


PLATE 21—Record of typical ground water well with contemporaneous precipitation and soil temperature, Richmond-Chase asparagus tract.

The relation of even greater serviceability would be that between use of water and yield of commercial crop, if it can be established that such a relation exists. On Plate 20 one point is shown for each tank from which the yield of ears was obtained. These yields, E, in thousands of pounds per acre are the abscissas of the points, and U, the ordinates, are the same as on Plate 19. The points scatter so widely that no linear equation will express satisfactorily the use-yield relation. The line shown is defined by the equation $U = 0.17\ E + 1.48$. It is apparent that the deviations of some of the points are so great as to discourage the use of the line and equation in estimating consumptive use of water.

Asparagus

No direct measurements have been made of the amount of water applied to asparagus fields nor of the amount of water used by that

crop in the field. Some note has been made of the practice on the 900-acre asparagus ranch of the Richmond-Chase Company, located on peat land in Reclamation District No. 548, about three miles east of Terminous. In 1926, at the beginning of the cutting season the water table stood at from 18 to 38 inches below the ground surface; the corresponding figures at the end of the cutting season were 30 to 40 inches. The cutting season usually covers a period from some time in March to July 1. When the cutting season was over the ranch was irrigated and the water table brought up to about 14 inches. No part of the ranch was irrigated in 1927 or 1928. The aim has been to get better drainage and further lower the water table. Records were kept in 1928 on the elevation of the water table as observed in 27 two-inch ground water wells distributed quite uniformly over the ranch. The record of a typical well is shown on Plate 21, which shows also the contemporaneous precipitation and soil temperature. Except for fluctuations early in the season, due to rainfall, the ground water remains at a moderately high level until July 1, the close of the cutting season. From this date on the spears are permitted to grow into the fern, or tops, and the water table falls until the autumn rains come.

PLATE 22—Asparagus tanks on Richmond-Chase tract showing growth on May 22, 1928. Tanks were planted February 10, 1927.

The Richmond-Chase ranch was selected as the location for tank experiments with asparagus. The tanks, each with a circular soil surface area of 9.28 square feet, were installed and planted early in 1927. Pistillate plants were set in the odd number tanks and staminate plants in the even numbered ones, except in the case of tank No. 4, in which a pistillate plant was set by mistake. The water table during the growing season has been held at two feet below the ground surface in tanks 1 to 4, inclusive, three feet in tanks 5 to 8, inclusive,

and at four feet in tanks 9 to 12, inclusive. All spears were allowed to grow without cutting the first year.

The same procedure was followed in 1928 as in 1927. No spears were cut because it was believed that if the plants grew unmolested for a second season they would be better established. Justification for this practice can be found among growers, although many cut for a short time during the early part of the second season. As was to be expected, the second year's growth was more vigorous than that of the first year, and more water was used. The results for both years are given in Table 225.

TABLE 225

USE OF WATER BY ASPARAGUS GROWN IN PEAT SOIL IN TANKS

Tank number and year	Depth to water table, feet	Use of water per acre		Top growth by plants, per acre		
		Staminate plants, acre-feet	Pistillate plants, acre-feet	Staminate, pounds	Pistillate	
					Tops,[1] pounds	Berries,[2] pounds
1927—						
1	2		1.72		721	1,514
2	2	2.62		1,108		
3	2		2.17		1,322	1,821
4	2		2.62		1,405	3,180
5	3		1.13		620	58
6	3	1.41		1,168		
7	3		1.35		575	965
8	3	.67		1,183		
9	4		1.85		1,978	308
10	4	0.83		470		
11	4		1.40		1,489	588
12	4	1.32		1,582		
1928—						
1	2		3.30		3,014	3,857
2	2	6.29		4,827		
3	2		4.98		4,160	879
4	2		3.78		4,138	2,872
5	3		2.56		3,200	174
6	3	3.20		2,013		
7	3		3.36		3,203	6,741
8	3	3.74		2,770		
9	4		3.87		3,872	24
10	4	1.30		1,324		
11	4		1.95		2,126	385
12	4	1.55		1,582		

[1] Tops dried at room temperature.
[2] Berries weighed without drying.

Plate 23, on which the symbols for the points indicate sex of plant, depth to water table and year in which grown, shows that although there is a general linear trend in the relation of use of water to yield of dry tops, the deviations are greater than in the cases of other crops—except corn—grown in tanks. It remains for the data of subsequent years to determine the relation, if any, of use of water to yield of commercial crop in the form of spears.

Onions

The water applied in irrigation of onions on peat land has been measured in only one season, that of 1927. The numerical data are as follows: Area of field, 25.02 acres; length of irrigation season, April 30 to July 11, 73 days; water admitted to field, 12.95 acre-feet

per acre; water drained from field, 10.53 acre-feet per acre; net irrigation 2.42 acre-feet per acre; yield, 146 sacks per acre. The yield is rated as only fair. It was affected in considerable degree by two varieties of pest. An inferior condition occurring mainly in low spots in the field is believed to have been due to neglect to adapt irrigation procedure to those spots. It is surmised that, on the whole, the measured use of 2.42 acre-feet per acre may be somewhat too low to be considered as fully representative.

The irrigation of a 28-acre field of onions in the north central part of the lower unit of Reclamation District No. 999 amounted in 1927 to 2.18 acre-feet per acre. Adding the ground-water decrement gives 2.45 acre-feet per acre, and when this is increased by the estimate for seepage the total use becomes 2.95 acre-feet per acre. The water was pumped and was distributed through spud ditches spaced 60 feet

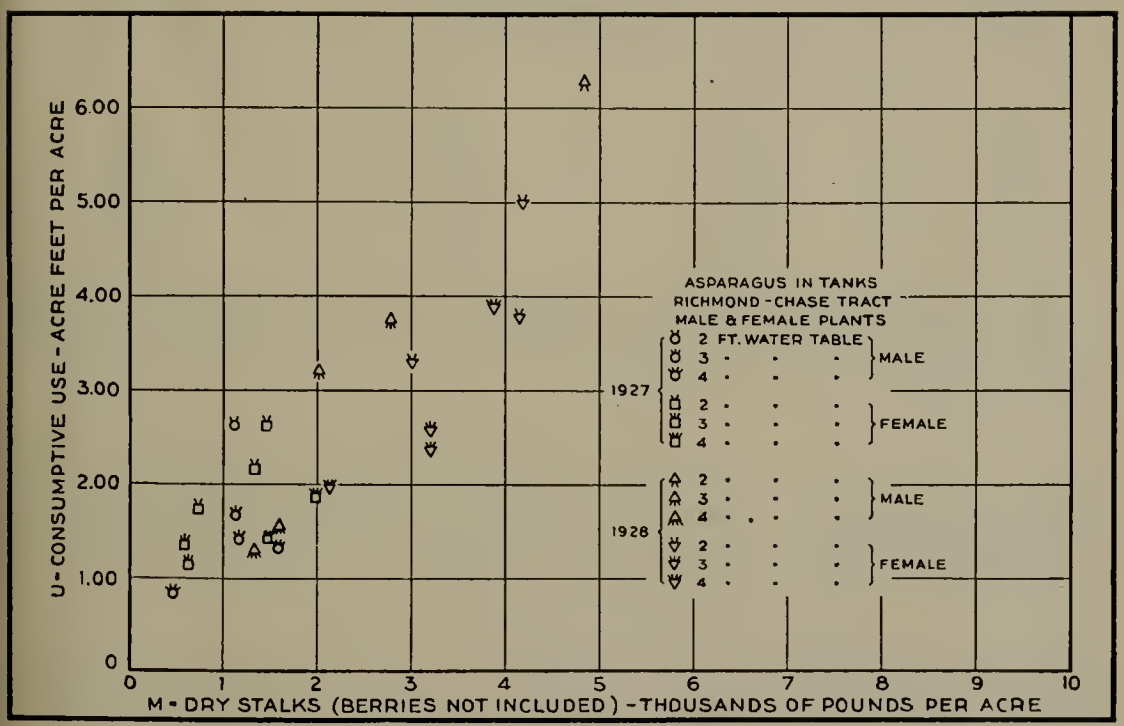


PLATE 23—Relation of consumptive use of water to yield of dry matter for asparagus grown in tanks.

apart in the field. The evaporation from the cropped soil was probably high, as the water table was kept near the surface and the ground was not heavily shaded.

Onions were not grown in tanks within the period covered by this report.

Barley

On May 6, 1925, twelve tanks, numbered 17 to 28, inclusive, were set in a barley field on Medford Island. The inner or soil cylinders were forced down in the peat in such manner as to retain the barley stand on the soil area included by the cylinder. The grain was already headed out but was not yet in the milk when observations were commenced. The crop was removed from tanks 17 to 20, inclusive, and the soil area therein kept bare of all growth during the period of observation. Tanks 21 to 28, inclusive, in which the barley was left to mature, soon developed a considerable growth of weeds. These were not dis-

turbed until the barley was harvested, when they were cut and the weight of dry matter in them as well as in the barley was determined. Analysis shows that the chief demand for water during the period of observation came from the weeds. The barley was approaching maturity of growth at the time that the tanks were installed and it soon yielded to the weeds its precedence in demand on available water. It was therefore desirable that the use of water by the barley and that by the weeds be segregated if possible to do so. Table 226 gives the observed data.

TABLE 226

USE OF WATER BY BARLEY AND WEEDS GROWN IN TANKS ON MEDFORD ISLAND IN 1925

Tank number	Dry matter		Water used,[1] acre-feet per acre
	Barley, pounds per acre	Weeds, pounds per acre	
21	13,182	2,764	1.096
22	10,666	6,058	1.575
23	10,504	1,142	0.534
24	8,862	993	0.472
25	10,543	2,930	0.926
26	11,934	1,059	0.715
27	10,153	5,114	1.270
28	11,709	2,483	0 827

[1] The water used, as noted in above table, has been computed as th sum of the number of measures of water actually added to the tank during the period of observation, and the number of measures of water corresponding to the sinkage of the water surface in the annular space in the tank.

In the equations which have been presented to express the relation between use of water and yield in the case of other crops there have been only two variables and the equation therefore defined a line. The presence of the weeds in this case introduces a third variable, so that the adjusted equation becomes that of a plane, thus:

$$U = 0.0690\ B + 0.1909\ W - 0.359$$

where for each tank U is the consumptive use of water, in acre-feet per acre, B is the yield of dry matter (straw and grain from the barley plants, and W is the dry weight of weeds, both in thousands of pounds per acre. Using the equation for computing U and comparing the result with observed U we have Table 227.

TABLE 227

COMPARISON OF COMPUTED AND OBSERVED CONSUMPTIVE USE OF WATER BY BARLEY AND WEEDS GROWN IN TANKS ON MEDFORD ISLAND IN 1925

Tank number	Observed use, acre-feet per acre	Computed use, acre-feet per acre	Residuals, acre-feet per acre
21	1 096	1.079	—.017
22	1.575	1.533	—.042
23	0.534	0.584	+.050
24	0 472	0.442	—.030
25	0 926	0.928	+.002
26	0 715	0 667	—.048
27	1.270	1.318	+.048
28	0 827	0 923	+.096

It is submitted that the close agreement of the observed and computed values of use of water in the above table is significant.

Orchards

The water applied in irrigation on a pear orchard was recorded in 1926 and 1927. The orchard was set out in 1922, and occupies 105 acres of the lighter type of soil along Elk Slough and the Sacramento River. Water is pumped from Elk Slough and distributed through concrete pipe. The contour border method is employed in irrigation. The use of water, in acre-feet per acre, in the two years, respectively, appears in Table 228.

TABLE 228

USE OF WATER BY 105-ACRE PEAR ORCHARD, RECLAMATION DISTRICT No. 999

Segregation	Year	
	1926	1927
	Acre-feet per acre	Acre-feet per acre
Pumped water	1.67	1.25
Ground water decrement	0.25	0.48
Seepage	0.50	0.50
Total use	2.42	2.23

Other Crops

The Sacramento-San Joaquin Water Supervisor's survey of crop acreages in the delta (Tables 213 to 217) lists the following which have not been treated in the foregoing paragraphs: alfalfa, hay, pasture, seed, and truck and miscellaneous vegetables. A considerable volume of data on alfalfa grown in tanks at Davis has been made available by the Division of Irrigation Investigations and Practice of the California Agricultural Experiment Station. The adaptation of this to serve as a basis for the estimate of the consumptive use of water by alfalfa in the delta is contemplated. Some of the remaining crops listed will be made the subject of future tank experiments if the project can be arranged to include them. The miscellaneous nature of the crops under some of the headings forbids undertaking to accomplish complete specific determinations in this manner, so that the estimate for them must be based upon such observations and data as it may be possible to bring together, supplemented perhaps by specific determinations in the cases of a few crops judged to be representative of the groups to which they are respectively assigned.

Aquatic Plants, Weeds and Marginal Growths

Subsequent to the period to which this report relates, tules and cat tails have been set in tanks in Reclamation District No. 999 and the use of water noted. Additional tank work to secure data concerning weeds may also be undertaken, for use with the results herein reported for Medford Island in 1925. No direct experiments on tree growth—

i. e., willows and the like—are in immediate contemplation as a part of this project. The Cooperative Irrigation Investigations is, however, conducting such experiments in Southern California, and the results will be available for adaptation to delta uses.

Evaporation from Water Surfaces

The large area of open water in the delta makes the evaporation from its surface an important term in the summation of uses and withdrawals in that region. Table 229 sets forth a summary of records of evaporation from the surface of water in tanks on King and Medford islands and in Reclamation District No. 999.

Evaporation from Soil Surfaces

The evaporation from bare soil surfaces in tanks has been determined as set forth in Table 230.

From the figures in Table 230 it may be inferred that for an entire season of about 150 days, with the water table at from two to three feet below the ground surface, the evaporation from a bare peat soil in the delta will amount to about one-half of an acre-foot per acre. On sedimentary lands it is apparently somewhat less. The evaporation from a cropped soil in a season or in a less period of time can not, however, be assumed to be the same as from the bare soil. In fact, there are reasons for supposing otherwise. The shading of the soil by the crop, together with the action of the roots of the crop plants in extracting moisture from the soil and preventing it from rising to the

TABLE 229

EVAPORATION FROM WATER SURFACE IN TANKS IN THE SACRAMENTO-SAN JOAQUIN DELTA

Month	Year and location							
	1925		1926		1927		1928	
	King Island	Medford Island	King Island	Reclamation District No. 999	King Island	Reclamation District No. 999	King Island	Reclamation District No. 999
	feet	feet	feet	feet	feet	feet	feet	feet
May	[1].119	[6].191	----------	[6].222	----------	[10].646	----------	----------
June	.687	.687	.622	1.146	[6].222	.770	.485	----------
July	[3].533	.670	.663	.999	.663	.861	.388	----------
August	[3].396	.674	.595	.704	.431	.700	.397	.762
September	[4].392	[7].599	[8].380	.613	.332	[11].525	.312	[6].448
October	[5].129	----------	----------	----------	----------	.603	----------	----------
November	----------	----------	----------	----------	----------	.132	----------	----------
To January 10	----------	----------	----------	----------	----------	078	----------	----------
Summation	2 256	2 821	2 260	3 684	1 648	4 315	1 582	1 210

[1] Six days.
[2] Vines shading tank for balance of growing season.
[3] Estimated from record for 28 days.
[4] Approximate.
[5] Twenty days.
[6] Ten days.
[7] Twenty-four days.
[8] Twenty-two days.
[9] Eight days.
[10] Twenty-six days.
[11] Approximate. Tank disturbed by meddlers.

TABLE 230

EVAPORATION FROM BARE SOIL SURFACE IN TANKS IN THE SACRAMENTO-SAN JOAQUIN DELTA

Tank No.	Location and year	Time			Mean water table, feet	Evaporation, acre-feet per acre	Remarks
		From	To	Days			
17	Medford Island 1925	5-15	8-6	83	3	0.178	
18		5-15	8-6	83	3—	0.208	
19		5-15	8-6	83	2.25	0.248	
20		5-15	8-6	83	3+	0.152	
17	Medford Island 1925	8-6	10-24	79	3.2	0.126	
18		8-6	10-24	79	3.2	0.146	
19		8-6	10-24	79	2.7	0.296	
20		8-6	10-24	79	3.3	0.086	
21		7-29	10-24	87	3.2	0.221	
22		8-4	10-24	81	3.3	0.270	Tanks 21 to 24 had barley stubble burned
23		8-4	10-24	81	3.4	0.202	
24		8-4	10-24	81	3.3	0.176	
25		8-4	10-24	81	3.4	0.224	
26		8-4	10-24	81	3.2	0.214	Barley stubble was left in tanks 25 to 28
27		8-4	10-24	81	3.5	0.348	
28		8-4	10-24	81	3.5	0.212	
5	King Island 1925	6-4	10-26	144	2.5	0.61	
6		6-4	10-27	145	2.5	0.49	
8		6-4	10-26	144	2.5	0.55	
14		6-4	10-26	144	2.5	0.55	
4	Reclamation District 999 1928	7-26	9-20	56	----------	0.118	
5		7-26	9-20	56		0.105	Evaporation from water surface in tank was 1.34 feet in same period
6		7-26	9-20	56	2.5	0.138	
8		7-26	9-20	56	to	0.197	
10		7-26	9-20	56	3.3	0.074	
11		7-26	9-20	56		0.083	
12		7-26	9-20	56		0.173	

surfaee to evaporate, would seem to postulate that evaporation would be materially less than from bare soil. The segregation of evaporation from a cropped soil has not been accomplished in this work.

Yield of Crop as a Basis for Estimating Consumptive Use of Water in its Production.

It is submitted that the various equations of the form $U = a\ Y + b$ which have been derived from data of crop plants in tanks affords a basis for a practical method of estimating the consumptive use of water in the delta by crops and plants which have been investigated in that manner. The additional necessary factors are the acreages and anticipated rates of yield of the respective crops. The Sacramento-San Joaquin Water Supervisor has made and reported in each of the years 1924 to 1928, inclusive, a detailed survey to determine the acreage of each crop (Tables 213 to 217), and there are also some earlier data covering the same items. It remains to collect the information from which total and average yields may be deduced. Having these factors and a supplementary knowledge of pertinent conditions and trends, it will be possible to forecast for greater or less length of time ahead the acreages and yields, and to apply the equations to estimate consumptive use by the crops for which they have been derived. An important advantage of the linear relation is that average use corresponds to average yield, and total use to total yield.

The validity of the procedure outlined above depends upon how completely established the equations are as relating to use and yields

with crop plants grown in tanks and how confidently they may be applied, either directly or through modification, to field conditions in the same climate and soils and in other years. Full discussion of this phase of the question will be deferred to a later report. For the present it may be said that although the form of equation suggests that the constant b may represent the evaporation from the cropped soil surface and a the transpiration for each unit of yield produced, such an interpretation is inconsistent with the values of b and a encountered in some instances. It seems that the equation must be regarded as of statistical rather than rational nature and derivation.

In the application of the method to field conditions it must be borne in mind that it undertakes to account for no factors of use of water

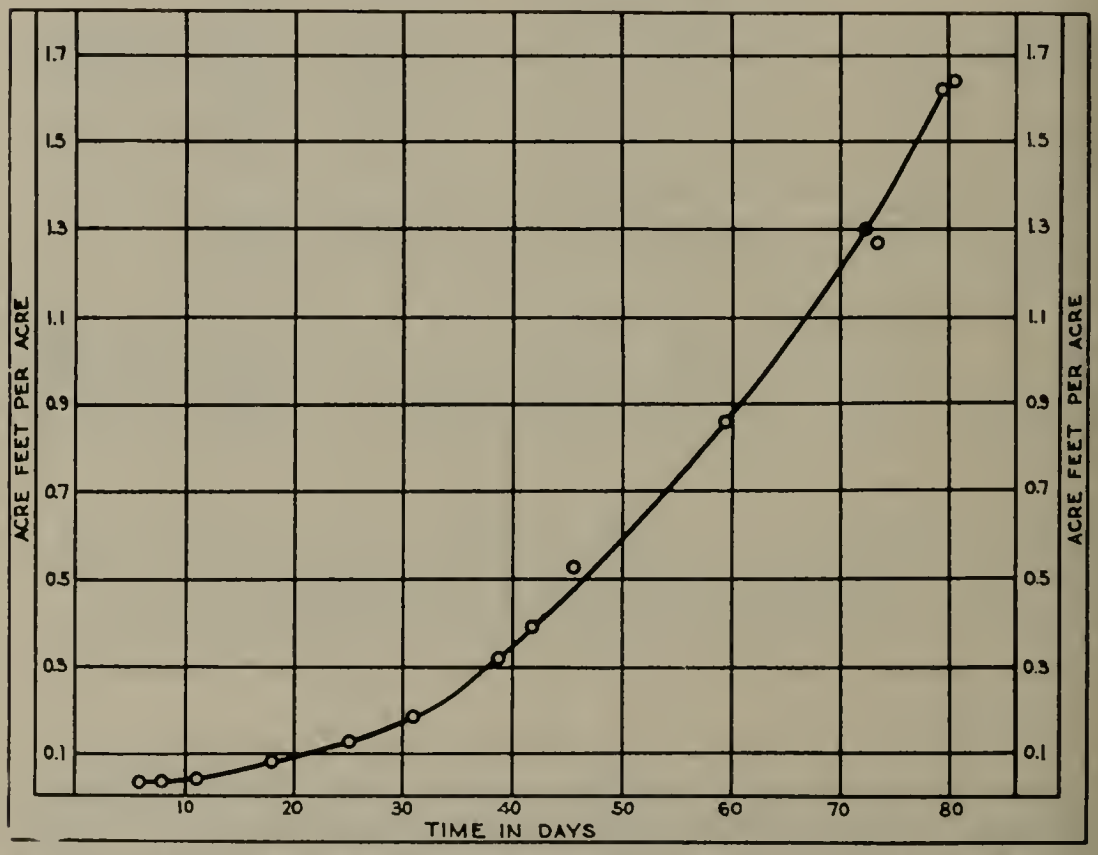


PLATE 24—Accumulated use of water by barley and weeds in Tank No. 22, Medford Island, 1925.

other than evaporation from the surface of the cropped soil and transpiration from the plants growing in the soil. If other factors are present, they must be evaluated by other methods. It is believed, however, that none will obtrude in the calculation to determine consumptive use in the low-lying lands of the delta as a whole, nor so long as no areas less than an entire island or tract are considered.

The Seasonal Distribution and Maximum Rate of Consumptive Use.

All of the tank observations have been made in such a way that the rate of consumptive use at any time or for any period in the irrigation season may be computed. Only representative instances and such composites as have been prepared will be included in what follows, as the complete showing would burden this report unduly. The record

of water admitted to the lower unit of Reclamation District No. 999 affords data for time-admittance graphs which bring into view the seasonal distribution and maximum rates of admittance. (See Plate 26.) Continuous records were obtained of water admitted to and drained from fields of single crops on peat lands. The seasonal distribution and maximum rates of application, as derived from these records, will be submitted for some instances. The records on fields of single crops on the sedimentary lands in Reclamation District No. 999 were not kept in a manner to throw much light on seasonal distribution and rates of application.

Plate 24 shows the accumulated use of water by barley and weeds in tank 22 at Medford Island in 1925. In the latter part of the period covered the use is entirely by weeds, the barley having ripened. The maximum rate of use is at the end of the period, amounting to about 0.25 acre-feet per acre in 5 days, corresponding to 1.5 acre-feet per acre in 30 days. The time was late July and early August.

Plate 25 shows the accumulated use of water by potatoes in tanks and in a single field. Fig. 1, Plate 25, shows the accumulated use from tanks, including one bare tank and one covered tank, at King Island in 1925. Fig. 2, Plate 25, conveys the same information for potato tank No. 3 in Reclamation District No. 999 in 1926. Fig. 3, Plate 25, presents for comparison the accumulated irrigation on a potato field of 11.84 acres on King Island in 1926. The comparison develops the fact that tank experiments reflect actual consumptive use much more accurately and clearly than do field measurements. The young plant uses water at a slow rate in the early part of the period and the tank curves mount slowly; then with increasing size and vigor of the plant the curve is much steeper; and finally, with the maturing of the plant, the rate of rise of the curve is reduced even below that for the bare tank. In contrast to this, the graph of accumulated net irrigation as measured in the field is of nearly uniform slope, showing little conformity to the actual demands of the crop and indicating that there must have been underground movement of water into and out of the field.

The graph (Fig. 1, Plate 25) of use of water by uncovered potato tanks Nos. 1, 10 and 11 at King Island in 1925 shows maximum 30-day use amounting to 1.09, 0.71 and 0.74 acre-feet per acre, respectively, equal to 52, 53 and 52 per cent of the respective total uses. The corresponding figures derived from Fig. 2, Plate 25, are 1.11 acre-feet per acre used in 30 days, equal to 66 per cent of the total use by potato tank No. 3 in Reclamation District No. 999 in 1926.

Plate 26 shows the cumulative curves of water admitted to the lower unit of Reclamation District No. 999 by pumping plants, siphons and gravity inlets for the four seasons, 1924 to 1927, inclusive, and shows also the rates of admittance throughout the season of 1927. The corresponding rates for the other three seasons may be closely approximated by computation from the cumulative values shown for those years. It is shown that the maximum rate for thirty days in 1927 was about 0.3 acre-feet per acre, occurring in July, and it appears that the rate in July of the other seasons was about the same as in 1927, although in some of them the rates in June and August were nearly or quite as high as in July. It must be borne in mind that the

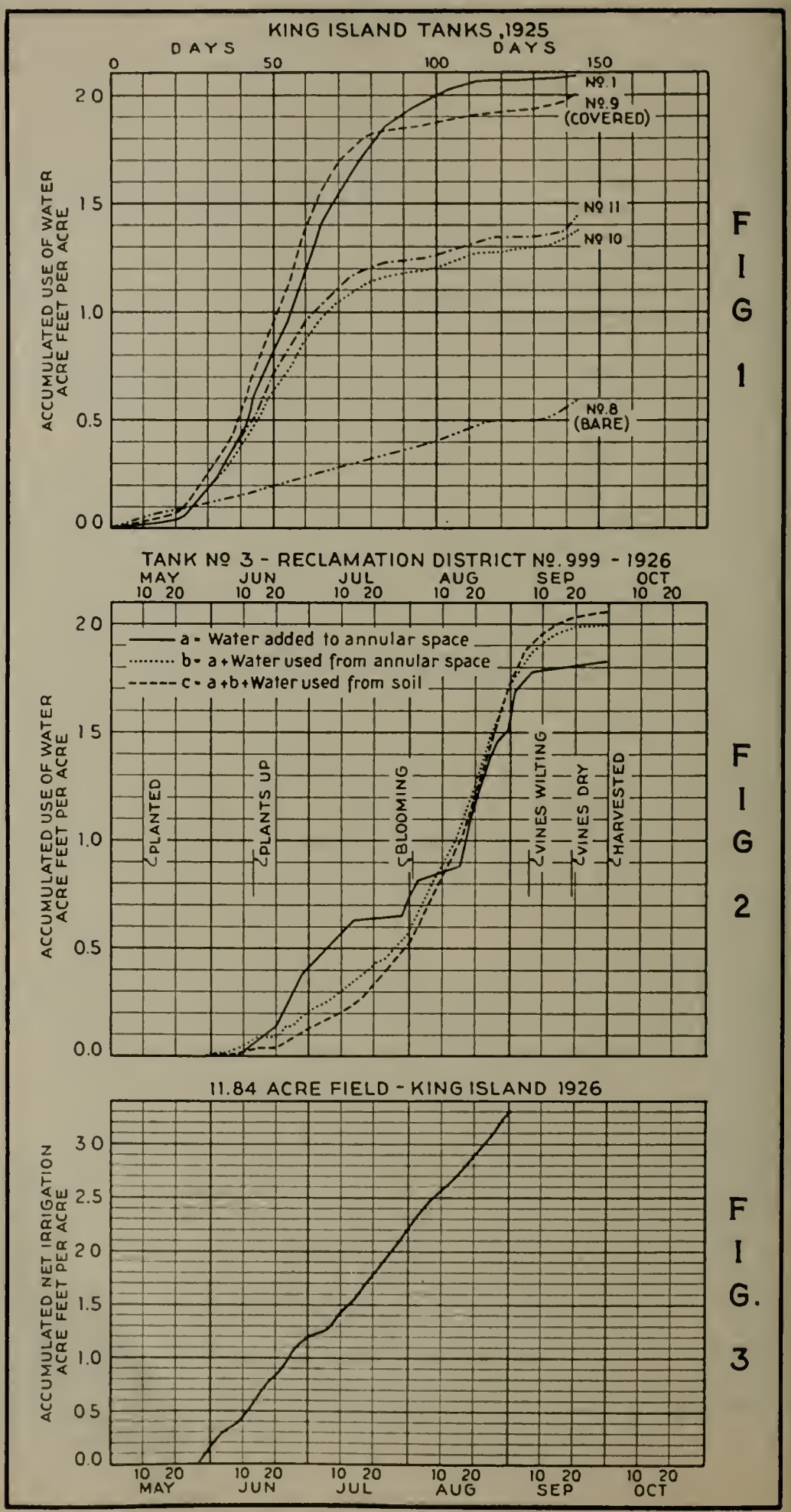


PLATE 25—Accumulated use of water by potatoes.

July admittance rate of 0.3 acre-feet per acre does not represent the whole of consumptive use in the area. The seepage contribution and the ground water decrement must be added, and when this is done the figure may be increased in significant amount. The seepage contribution for the season has been estimated at 0.5 acre-feet per acre. If this is delivered at a fairly uniform rate about one-fifth of it should be apportioned to July. The ground water curve for 1927 shows that in July there was a lowering of the water table and some depletion of ground storage. The indications, on the whole, are to the effect that July consumptive use amounts to about 0.5 acre-foot per acre, or about 25 per cent of the total for the season.

It is submitted that this figure can be applied with confidence to sedimentary lands generally throughout the delta, except where the crops grown are so different as to set up a distinctly different water

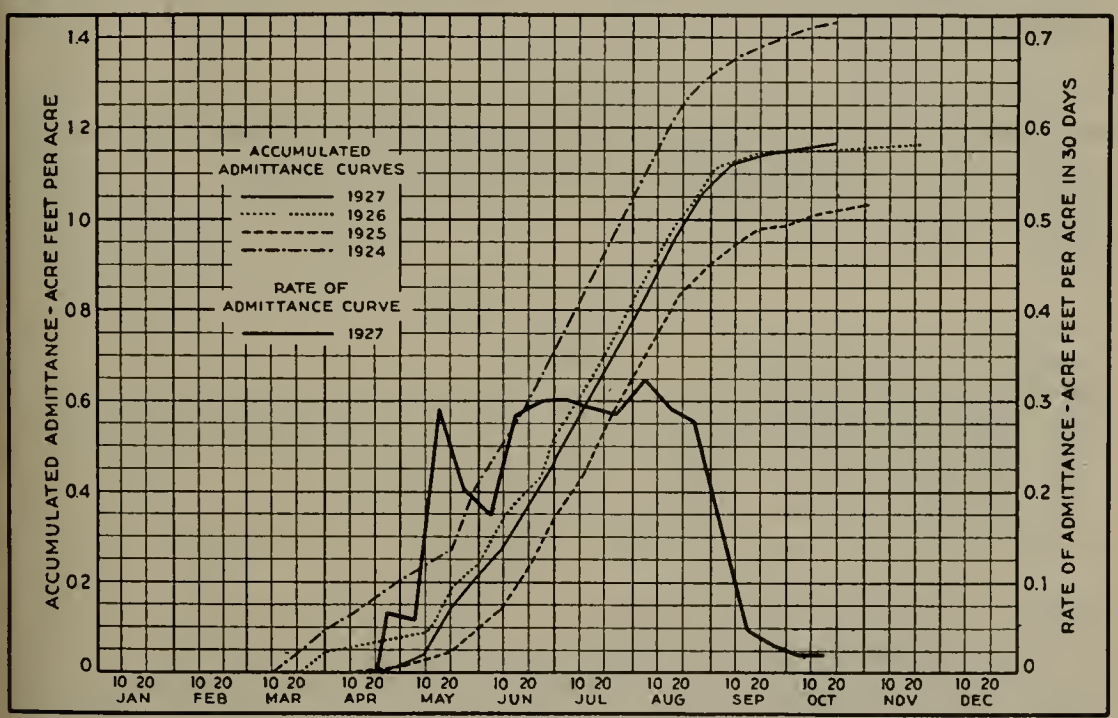


PLATE 26—Accumulated admittance of water, 1924 to 1927, inclusive, and rates of admittance, 1927, for pumping plants, siphons and gravity inlets. Lower unit, Reclamation District No. 999.

requirement. Some extensive areas are given over chiefly to corn, a crop which occupies only a small acreage in Reclamation District No. 999. The rate of use by that crop in its period of most rapid growth is considerably in excess of that developed on an area producing a combination of various crops, the most of them using water at a less maximum rate and not all of them coming at the same time to the period of maximum use. No data of use of water by corn on sedimentary lands have been obtained. The results of observation on the peat lands must therefore, for the present, be depended upon to serve for the sedimentary lands as well. The following are instances of the series which will be presented in full in a latter report. Tank 2 at King Island, in the 30-day period July 10 to August 9, 1926, used 1.69 acre-feet of water per acre. This was 43 per cent of the total use for the season. Tank 7 at King Island, July 13-August 12, 1926, used

1.61 acre-feet per acre, or 39 per cent of the season's total. King Island tank 1, in the 30 days following the first week in July, 1927, used 1.40 acre-feet per acre, equivalent to 52 per cent of the season's total. The maximum rate of net application of water to the 33-acre field of corn on King Island in 1926 was found in the 30-day period June 26-July 26. It was 0.83 acre-foot per acre, or 35 per cent of the total net application for the season.

The maximum use over a 30-day period—in June and July of 1927—by sugar beets in six tanks in Reclamation District No. 999 was 0.72 acre-foot per acre, equivalent to about 37 per cent of the total use for the season. No tank showed more than a small deviation from this ratio, the maximum in the direction of excess being 40 per cent of total use.

Table 231 shows the maximum use of water, over a period of 30 days, by beans grown in tanks in Reclamation District No. 999 in 1926 and 1927.

TABLE 231

MAXIMUM 30-DAY USE OF WATER BY BEANS GROWN IN TANKS IN RECLAMATION DISTRICT No. 999

Year	Item	Tank No.					
		1	2	3	4	5	6
1926	Total use. Acre-feet per acre	1.26	0.86	1.57	1.53	1.87	1.57
1926	Maximum use over 30 days. Acre-feet per acre	0.72	0.58	0.72	0.84	1.00	0.84
1926	Maximum use. Per cent of total use	57	68	46	55	54	54
1927	Total use. Acre-feet per acre	0.99	1.29	1.13	1.11	1.06	1.12
1927	Maximum use over 30 days. Acre-feet per acre	0.37	0.47	0.43	0.46	0.38	0.42
1927	Maximum use. Per cent of total use	37	36	38	42	36	38

For the entire group in 1926 the 30-day maximum use was 54 per cent of the total use for the season; in 1927 it was 38 per cent. The 30 days of maximum use came mostly in August of both years, with more or less of extension over into September in the various cases.

Celery tank 5 at King Island, in October of 1927, used water amounting to about 0.5 acre-foot per acre, a little more than 30 per cent of the probable total use. The 2.18-acre field of celery on King Island had water applied to it at an approximately uniform rate during its irrigation season in September and October, 1926. This rate was equivalent to about 0.83 acre-foot or 10 acre-inches per acre in 30 days. The small area of the field justifies the presumption that part of the water applied drained under ground across its boundaries into adjacent fields. The record of irrigation of the 16.45-acre field of celery on King Island in 1927 shows a maximum 30-day net application of about 0.6 acre-foot per acre, in a period about equally divided between the months of September and October. This is about 45 per cent of the total seasonal application on the field.

Net application of water was effected at a nearly uniform rate for more than one-half of the irrigation season from April 23 to July 11, 1927, on 25.02 acres of onions on King Island. The maximum 30-day rate, coming in the period from middle of May to middle of June,

was 1.35 acre-feet per acre. This is 56 per cent of the net application for the season.

The young asparagus, in the first season of its growth in tank 8 on the Richmond-Chase ranch, used 0.37 acre-foot of water per acre in the month of September, 1927. This maximum 30-day rate was only a little in excess of the rate for August. The maximum 30-day use was only 22 per cent of the use in the entire season of record, from April 11 to December 9, or 28 per cent of the use to October 24, the close of the season of detailed record.

Orchard irrigation in Reclamation District No. 999 was not recorded in such manner as to furnish light on seasonal distribution of the use of water.

Consumptive Use in Reclamation District No. 999.

The suspension, at the close of the season of 1927, of full-scale operations of the Cooperative Irrigation Investigations on the sedimentary lands of the lower unit of Reclamation District No. 999 called for a review of data and results to determine how nearly the primary objective of the work had been attained. In fact, the justification for the suspension of the work lay in the assurance entertained that data had been accumulated to serve as a basis for the establishment of a reliable figure for consumptive use of water in that area. The result of the review is set forth in Table 232.

TABLE 232

USE OF WATER ON 23,500 ACRES OF SEDIMENTARY LAND IN THE SACRAMENTO DELTA—RECLAMATION DISTRICT No. 999, LOWER UNIT

(Acre-feet per acre)

	1924[1]		1925[1]		1926	1927
	Minimum	Maximum	Minimum	Maximum		
Rainfall	0.092	0.092	0.172	0.172	0.026	0.052
By surface inlets	1.525	1.740	0.981	1.129	1.171	1.168
Total on surface	1.617	1.832	1.153	1.301	1.197	1.220
Ground water decrement	0.260	0.260	0.285	0.285	0.341	0.288
Total determined use	1.877	2.092	1.438	1.586	1.538	1.508
Seepage	0.500	0.500	0.500	0.500	0.500	0.500
Consumptive use	2.377	2.592	1.938	2.086	2.038	2.008

[1] The two columns for each of the years 1924 and 1925 are necessary because the figures for the amount of water admitted by surface inlets involve an item concerning whose value there is uncertainty through a range equivalent to the difference between the maximum and minimum figures above noted.

The undetermined factor in Table 232 is the seepage contribution to the supply for consumptive use. It has been assigned a tentative value of 0.500 acre-foot per acre, and considerable assurance is felt that it is of that order of magnitude. This figure is based on the two methods of analysis which have been noted. (Page 372.)

Table 232 shows that for no one of the three years, 1925 to 1927, inclusive, does the sum of the rainfall, irrigation and decrement of ground water vary by more than a very small amount from 1.5 acre-feet per acre. The fact that the sum of these elements for the year 1924 is considerably greater than this lacks definite and assured explanation.

No reason is known why the total consumptive use of water in this year should have been greater than in others. Therefore, the inclination is to assume that inasmuch as the determined elements which enter into its composition are in the aggregate greater than in the succeeding years, the undetermined one, seepage, was less. The proposed further investigation of the seepage problems may determine the truth of the matter. In the meantime the estimate will be based on the record of the other three years, 1925 to 1927, inclusive. Taking this as the sum of the determined elements and one-half acre-foot per acre allowed for seepage, we have, as the annual consumptive use of water, on sedimentary land with a variety of delta crops, in the irrigation season, *two acre-feet per acre* of the area farmed.

Manifestly the same limitation in application of this figure for total consumptive use obtains as in the corresponding figure for maximum rate of use in the same area (page 401); that is to say, crops of distinctly different water requirements growing on sedimentary land will demand that a different figure, suitable for such crops, be deduced and applied.

CHAPTER VI

SALINITY INVESTIGATION

When low flow conditions prevail in the Sacramento and San Joaquin rivers during the irrigation season, a condition is reached where the supply of fresh water to the many channels in the extensive delta area lying between Sacramento on the north, Stockton on the east, Tracy on the south, and Antioch on the west, is insufficient to prevent the encroachment into these channels of salt water from San Francisco Bay. This salinity encroachment, far into the delta in some years and only touching its lower borders in others, has been the subject of more or less extended investigations since 1916.

The investigations, prior to 1921 by the State Water Commission, predecessor to the Division of Water Rights, and by the Division up to 1924, have been reported in detail in the biennial reports of the Division. Beginning with 1924, the investigations have been conducted through the office of the Sacramento-San Joaquin Water Supervisor and this chapter outlines the work in the five-year period 1924 to 1928, inclusive.

Purpose of Investigation.

The purpose of the investigation has been to determine as closely as possible the relation which may exist between the discharge of fresh water to the delta through the rivers and the advance and retreat of the salinity. In seasons of low stream flow it has also had the additional important purpose of supplying information to delta water users in order that their irrigation operations might be so regulated as to avoid the use of dangerously saline water.

Scope and Procedure.

The scope of the investigation each season has been such as to insure that samples of water to be tested for salinity would be taken at regular intervals at a sufficient number of stations throughout the delta and in the upper bay region, that the advance and retreat of the salinity from early summer to late fall would be completely recorded.

In carrying out this program the number of stations required has varied considerably with the seasons. Thirty-two stations were maintained in 1924, sixteen in 1925, thirty-nine in 1926, twelve in 1927, and twenty-five in 1928. Table 234 lists all stations at which observations were taken at any time in the five years, 1924 to 1928, and Table 235 shows for each station the seasons in which it was maintained. The pocket map accompanying this bulletin shows, on the enlarged inset of the delta area, the location of all stations.

Water samples at each station are taken by a local observer who is furnished with bottles and mailing containers, tide tables, instructions for sampling and a schedule showing the dates and time for taking the samples. The observer mails the sample to Sacramento and all tests are made at the chemical laboratory of the State Division of Highways. In 1924 and 1925 the samples were taken at two-day intervals. It appeared, however, that four-day intervals would furnish the desired records and,

beginning in 1926, all observers were instructed to take the samples on the 2d, 6th, 10th, 14th, 18th, 22d, 26th, and 30th of each month.

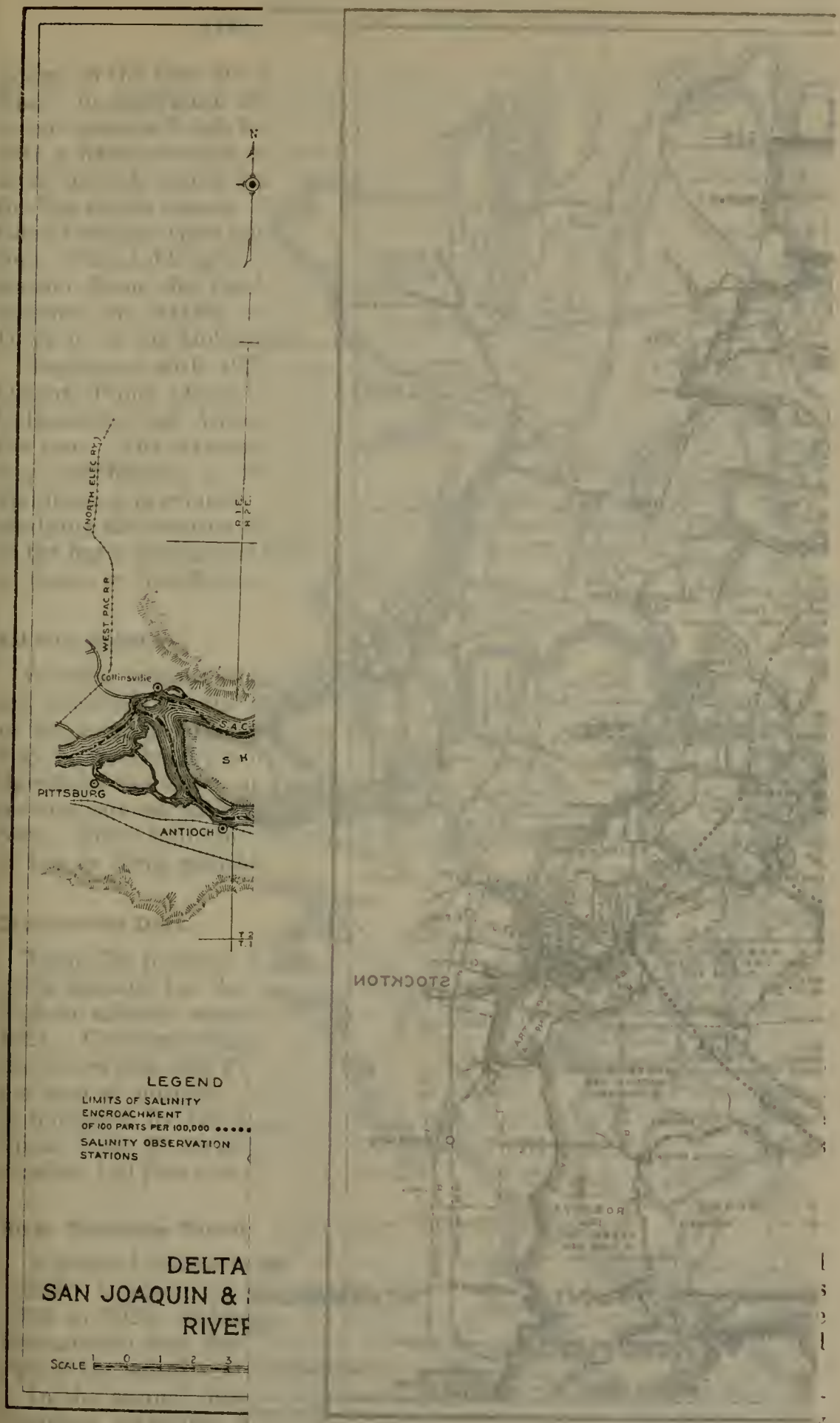
TABLE 233

MAXIMUM SALINITY AT BAY AND DELTA STATIONS, 1924 TO 1928, INCLUSIVE

Year	1924	1925	1926	1927	1928
Seasonal run-off to San Francisco Bay in per cent of normal	27	78	55	108	75
Station	Maximum salinity in parts of chlorine per 100,000 and date of occurrence				
San Francisco, San Pablo and Suisun Bays					
Point Orient	----------	----------	2,020 Sept. 30	1,880 Sept. 10	1,870 July 31
Point Davis	----------	----------	1,850 Aug. 26	1,510 Aug. 26	1,610 Aug. 2
Bull Head Point	----------	----------	1,690 Aug. 30	1,330 Sept. 2	1,410 Aug. 10
Bay Point	----------	----------	1,400 Aug. 23	950 Sept. 2	1,170 Aug. 10
O. and A. Ferry	1,345 Aug. 28	762 Sept. 26	1,100 Aug. 26	510 Aug. 30	750 Aug. 22
Sacramento River Delta					
Collinsville	1,150 Aug. 16	448 Sept. 6	1,020 Sept. 6	370 Sept. 10	590 Sept. 2
Emmaton	802 Aug. 6	136 Sept. 4	540 Aug. 22	65 Aug. 30	156 Aug. 22
Three Mile Slough Bridge*	692 Aug. 30	81 Sept. 6	430 Aug. 26	25 Sept. 10	109 Sept. 2
Rio Vista Bridge	608 Aug. 12	21 Sept. 2	256 Aug. 30	12 Sept. 26	44 Aug. 30
Isleton Bridge	310 Aug. 14	12 Sept. 16	68 Aug. 19	----------	13 Aug. 18
Liberty Ferry**	192 Aug. 16	11 Sept. 16	32 Aug. 26	----------	7 Sept. 26
Mokelumne River Delta					
South West Point	----------	----------	65 Aug. 26	----------	23 Aug. 10
Camp 33	113 Aug. 30	----------	32 Sept. 6	----------	25 July 30
Terminous, Camp 29	----------	----------	25 Sept. 2	----------	16 Aug. 30
San Joaquin River Delta					
Antioch	1,080 Aug. 20	356 Sept. 4	920 Aug. 26	179 Sept. 18	450 Sept. 2
Jersey	708 Aug. 30	81 Sept. 6	470 Aug. 26	53 Sept. 14	192 Sept. 6
Webb Pump	414 Sept. 6	24 Sept. 4	147 Aug. 14	16 Sept. 10	46 Aug. 30
Holland Pump	308 Oct. 4	18 Sept. 22	148 Sept. 2	----------	34 Oct. 10
Central Landing	288 Sept. 24	10 Sept. 2	98 Sept. 2	----------	19 Aug. 2
Palm Tract	----------	----------	86 Sept. 18	----------	21 Sept. 22
Middle River P.O.	186 Sept. 30	13 Sept. 10	69 Oct. 8	----------	21 Aug. 2
Mansion House	148 Oct. 12	11 Sept. 16	69 Sept. 26	----------	16 Sept. 2
King Island, Camp 3½	164 Oct. 2	----------	48 Sept. 28	----------	19 Oct. 12
Mandeville Pump	----------	----------	84 Sept. 30	----------	25 Aug. 2
Rindge Pump	126 Sept. 16	35 Sept. 2	50 Sept. 14	----------	28 Sept. 30

*Ferry 1924 and 1925.
**Liberty Farms Company Headquarters on Cache Slough above Ferry in 1925.

It is desired that the tests shall be representative of maximum salinity conditions for the particular day of observation and this requires, therefore, that the samples be taken at a particular time with reference to the tide. An early investigation of the relation between tidal stage and salinity at certain stations indicated, in general, that the maximum salinity condition occurred at approximately two hours after high tide. Later investigations seemed to show, however, that one and one-half hours would, on the whole, more correctly represent this interval. In 1924 and 1925 the observers were instructed to take the samples two hours after high tide but beginning in 1926 the instructions specified one and one-half hours. In the earlier work it was left to the observer to determine the time of high tide at his particular station and then to allow one and one-half or two hours before taking the sample. Later, the average time for travel of the high tide from the Golden Gate to each station was determined as closely as possible and the observer was instructed to add this time interval, plus one and one-half



68336—opposite p. 406

PLATE 27—Up

beginning in 1926, all observers were instructed to take the samples on the 2d, 6th, 10th, 14th, 18th, 22d, 26th, and 30th of each month.

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*Ferry 1924 and 1925.
**Liberty Farms Company Headquarters on Cache Slough above Ferry in 1925.

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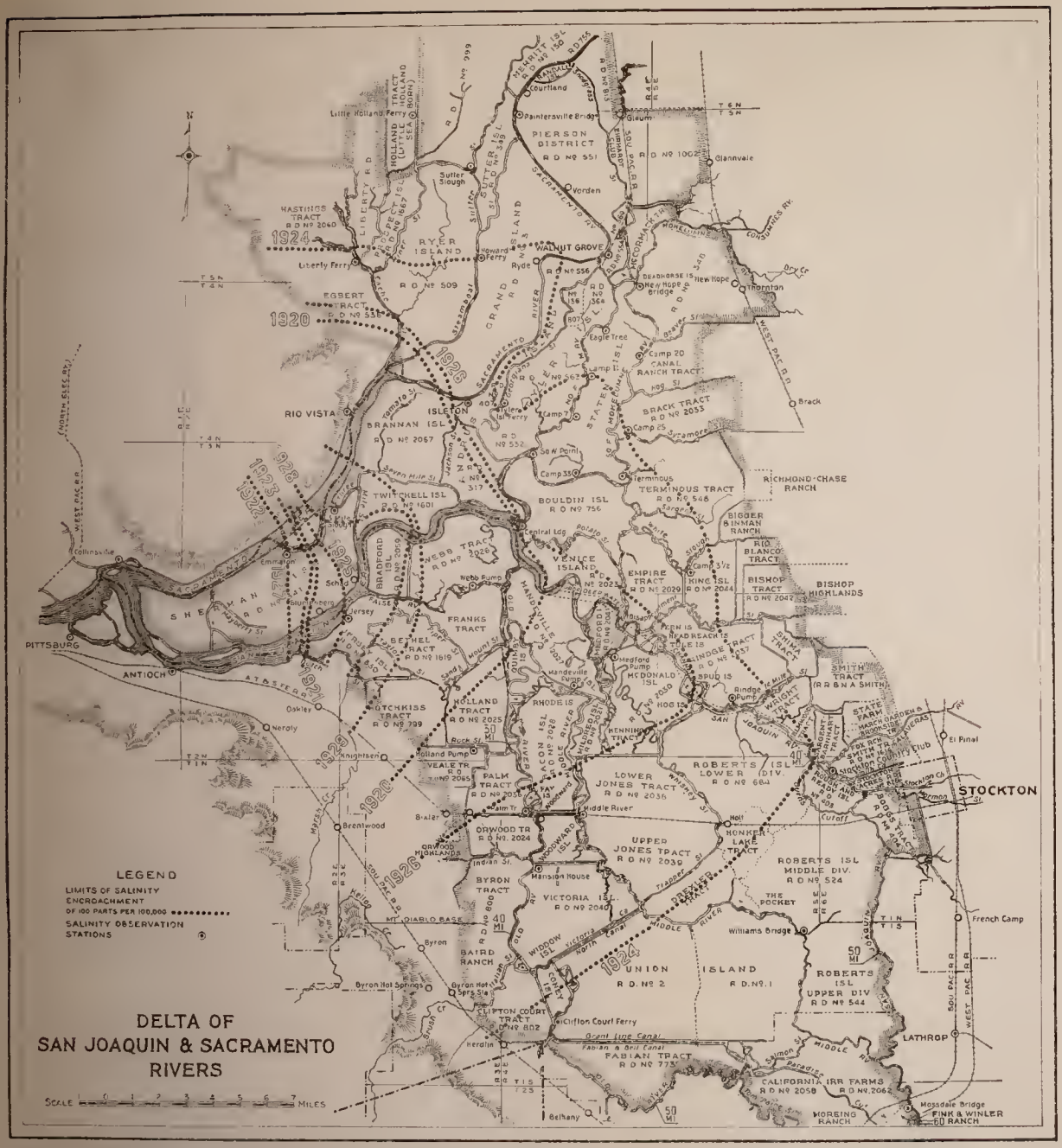

68826—opposite p. 406

PLATE 27—Upper limits of delta area within which the salinity reached 100 parts or more of chlorine per 100,000.

hours, to the time for high tide as given in the tide tables (for Golden Gate) to determine the time for taking a sample at his station. In recent seasons it has been found best, however, to supply each observer with a fixed schedule of sampling times. This is prepared in the office from the tide tables and time interval for each station and is made up for the entire season. Table 234 shows the time interval between high tide at Golden Gate and the time for sampling, as specified for each station. This table gives also the shortest water distance in miles to each station from the Golden Gate, Collinsville or Antioch according to whether the station is located on the upper bays, in the Sacramento Delta or in the Mokelumne and San Joaquin deltas.

Beginning with 1926, sampling at the seven lowest stations, Point Orient, Point Davis, Bullhead Point, Bay Point, O. and A. Ferry, Collinsville, and Antioch, has been maintained continuously throughout the year. The stations, Point Orient, Point Davis, and Bullhead Point, were established in February, 1926, to supplement the bay stations maintained previously thereto in securing more comprehensive data for studying the relation between the inflow from the rivers and the salinity in the bays, particularly at such times as the river flow becomes sufficient to make, or insufficient to keep, the bay waters fresh or low in salinity.

Salinity Bulletins.

In those seasons when the salinity encroaches upon the delta area to any great extent, the water users are concerned to know the conditions in the channels adjacent to their lands so that their irrigation operations may be governed accordingly. To keep the delta irrigators informed, therefore, the water supervisor's office has, in the seasons requiring this service, put out bulletins giving the latest available results of the salinity tests. These bulletins are mailed at about weekly intervals for a period of two or three months.

Comparative Data.

Table 233 presents a comparison of the maximum salinity at bay and delta stations for the years 1924 to 1928, inclusive. It shows that the highest salinity occurred in the 1924 season and the lowest in that of 1927. Correspondingly the seasonal run-off to San Francisco Bay of the rivers was only 27 per cent of normal in 1924 and in 1927 it was 108 per cent of normal. The extent of each season's salinity encroachment is indicated by the map, Plate 27, which shows, for each season, the upper limit of the delta area within which the salinity in the channels reached 100 parts or more of chlorine per 100,000 parts of water.

River Discharge-Salinity Relation.

A general indication of the relation between the river discharge and salinity is given by the graphs, Plate 28. These show, for the years 1924 to 1928, inclusive, the combined discharge to the delta of the Sacramento and San Joaquin rivers and the corresponding rise and fall of the salinity at representative delta stations.

In the annual mimeographed reports of the Water Supervisor, preliminary estimates have been made of the quantities of river flow required to control salinity at various delta points. However, at the

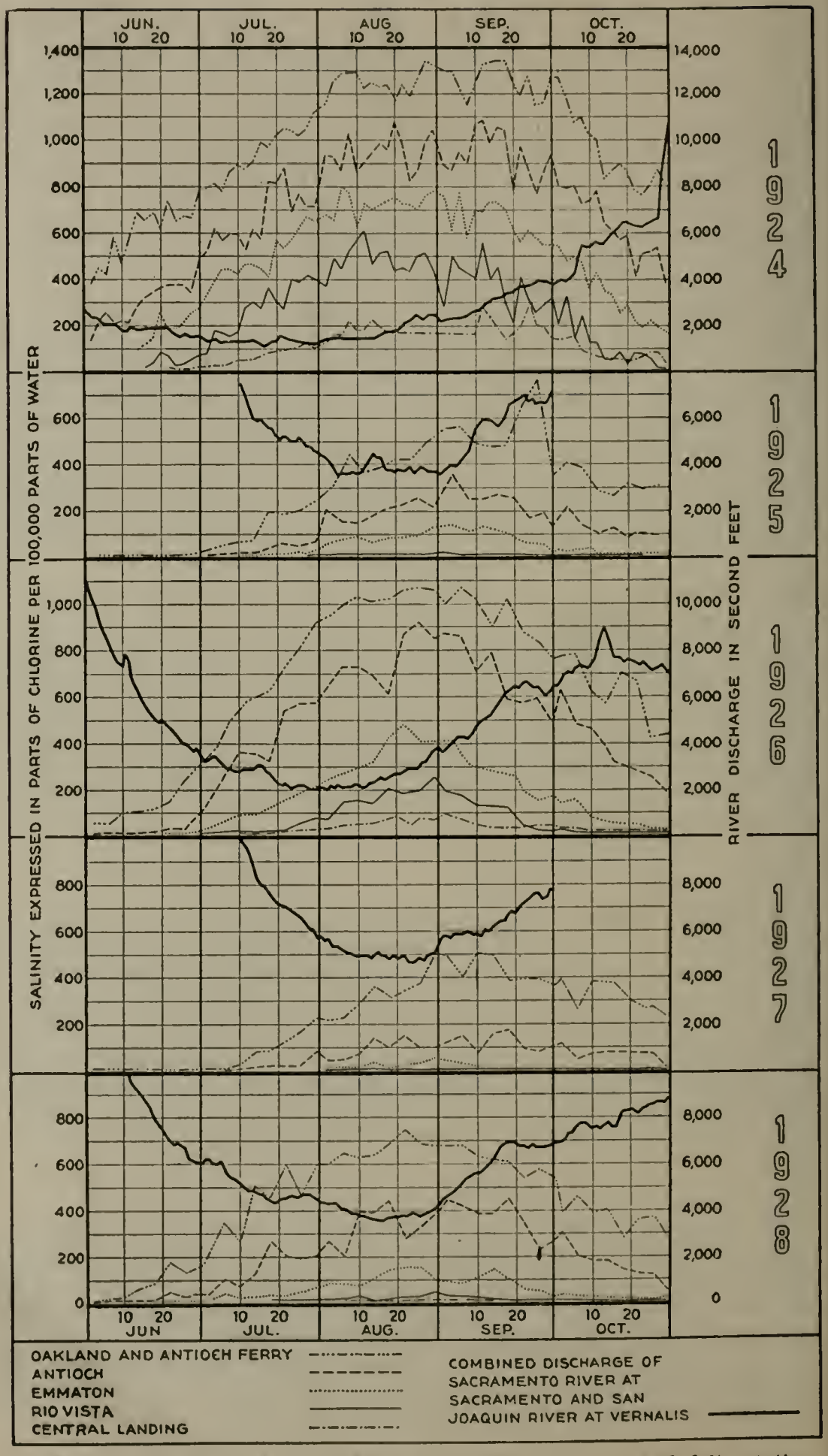

PLATE 28—Comparison of river discharge and salinity at bay and delta stations 1924 to 1928, inclusive.

time this bulletin is written (1929), there has been started in connection with the State-wide Water Resources Investigation of the Division of Water Resources, a much more comprehensive and intensive study of the salinity situation than anything heretofore attempted. For this reason, therefore, and until this more comprehensive investigation is completed, no analysis of data will be made nor conclusions drawn as to the river discharge-salinity relation. The complete results of the salinity investigations including the more extended study begun in 1929 will be published as a separate bulletin of the Division. This bulletin will carry also a complete tabulation of all salinity observations and tests from the inception of the investigation by the state to date. In the present bulletin, therefore, this chapter has been limited to an outline only of the investigation from 1924 to 1928, inclusive.

TABLE 234

DESCRIPTION OF SALINITY STATIONS AT WHICH OBSERVATIONS WERE TAKEN, 1924 to 1928, INCLUSIVE

Station	[1]Mileage	Time interval between high tide at Golden Gate and time for taking samples at station		Description
		Hours	Minutes	
San Francisco, San Pablo and Suisun Bays	Miles from Golden Gate			
Point Orient	12.3	2	30	Upper end San Francisco Bay, east shore, ½ mile south of Pt. San Pablo, wharf of Standard Oil Company.
Point Davis	25.2	3	20	Upper end San Pablo Bay, south shore, Oleum wharf of Union Oil Co.
Bull Head Point	34.0	4	20	Lower end Suisun Bay, south shore, wharf of Mountain Copper Co.
Bay Point	39.4	4	30	Center Suisun Bay, south shore, Bay Point wharf of Coos Bay Lumber Co.
O. and A. Ferry	46.3	4	40	Upper end Suisun Bay between Mallard Station and Chipps Island on San Francisco-Sacramento Railroad.
Sacramento River Delta	Miles from Collinsville[2]			
Collinsville	0	5	00	North bank Sacramento River at junction with San Joaquin River.
Emmaton	6.7	5	15	South bank Sacramento River just above Baker Point Cut, on Horseshoe Bend.
Three Mile Slough Bridge[3]	9.2	5	20	At junction of slough and Sacramento River.
Rio Vista Bridge	12.7	5	40	Right bank Sacramento River two miles below junction of Cache and Steamboat Sloughs.
Iselton Bridge	18.2	6	15	Left bank Sacramento River three miles above junction with Steamboat Slough.
Liberty Ferry[4]	19.1	6	20	On Cache Slough at junction with Lindsay Slough.
Howard Ferry	19.1	6	30	On Steamboat Slough, 1½ miles below junction with Sutter Slough.
Sutter Slough	23.3	6	50	At junction with Miner Slough.
Little Holland Ferry	25.0	6	55	Back borrow pit of Reclamation District 999, 2 miles above junction with Miner Slough.
Grand Island Bridge[5]	26.5	7	15	Sacramento River, ½ mile below upper end of Steamboat Slough.
Walnut Grove	26.6	7	00	Left bank Sacramento River at upper end of Georgiana Slough.
Paintersville Bridge	27.9	7	20	Sacramento River, 1 mile below Courtland.
Hood Ferry	31.4	7	50	Sacramento River, ½ mile above Hood.
Freeport Ferry	46.0	8	40	Sacramento River at Freeport.
Mokelumne River Delta	Miles from Antioch[6]			
Southwest Point	20.2	7	50	Staten Island, North Fork Mokelumne River, south bank, just above junction with South Fork.
Camp 7	22.9	8	00	Staten Island, North Fork Mokelumne River, south bank, approximately 3 miles above South Fork junction.
Camp 33	22.9	8	00	Staten Island, South Fork Mokelumne River, north bank, 2 miles above North Fork junction.

Tyler Island Ferry[7]	24.1	8	15	On Georgiana Slough, 1½ miles east of Isleton.
Camp 11	24.8	8	15	Staten Island, North Fork Mokelumne River, east bank, 4 miles above South Fork junction.
Terminous, Camp 29	25.6	8	15	Staten Island, South Fork Mokelumne River, north bank, opposite Terminous.
Eagle Tree	27.4	8	25	Staten Island, North Fork Mokelumne River, south bank, 1¾ miles below County Road bridge.
Camp 25	28.8	8	30	Staten Island, South Fork Mokelumne River, west bank, 1 mile above Sycamore Slough junction.
New Hope Bridge	30.1	8	40	North end Staten Island at division point for North and South Forks Mokelumne River.
Camp 20	31.4	8	50	Staten Island, South Fork Mokelumne River, west bank, ½ mile below Beaver Slough junction.
San Joaquin River Delta	Miles from Antioch			
Antioch	0	5	50	San Joaquin River, left bank, 3½ miles above Sacramento River junction.
Jersey	6.5	6	30	San Joaquin River, left bank, 1 mile below mouth of False River.
Webb Pump	12.5	7	00	Washington Slough, 2 miles below Old River junction.
Holland Pump	13.6	7	15	Rock Slough, north bank, 1½ miles west of Old River junction.
Central Landing	17.1	7	30	Bouldin Island, Mokelumne River, left bank, ½ mile above San Joaquin River junction.
Palm Tract	19.3	7	30	Old River, west bank, near Palm Tract pump, just north of Santa Fe Railroad crossing.
Middle River P.O.	20.6	7	40	Middle River, east bank, at Santa Fe railroad crossing.
Mansion House	21.9	7	50	Victoria Island, Old River, east bank, at junction with North Victoria Canal.
Medford Pump	25.0	8	00	South end Medford Island, on channel connecting Whiskey Slough and Middle River.
King Island, Camp 3½	28.1	8	15	West side King Island at junction of White Slough and Honkers Cut.
Mandeville Pump	28.2	7	50	South end Mandeville Island, Connection Slough, north bank, 1 mile west of Middle River.
Clifton Court Ferry	29.2	8	40	Old River just below junction with Grant Line Canal.
Rindge Pump	31.2	8	30	San Joaquin River, north bank, 1 mile below Fourteen Mile Slough junction.
Williams Bridge	34.6	9	10	Middle River, about 4 miles below Salmon Slough junction.
Wakefield Landing	35.2	9	05	San Joaquin River, left bank, just below lower end of Rough and Ready Island.
Stockton Country Club[8]	35.9	9	10	On Lindley Cut-off (San Joaquin River), north bank, about ¾ mile above Buros Cut-off junction.
Mossdale Bridge	53.4	10	15	San Joaquin River at Lincoln Highway Crossing, about 3 miles southwest of Lathrop.

[1] Estimated shortest water distance from Golden Gate, Collinsville or Antioch according to whether station is on the bays, in the Sacramento Delta or in the Mokelumne and San Joaquin deltas.
[2] Collinsville is 50.8 miles from Golden Gate.
[3] Prior to 1926 the station was at Three Mile Slough Ferry just below the junction of Three and Seven Mile sloughs.
[4] In 1925 samples were taken at Liberty Farms Company Headquarters on Cache Slough, about 1½ miles upstream from the Ferry.
[5] Bridge removed in 1925.
[6] Antioch is 53.1 miles from Golden Gate.
[7] Not properly in Mokelumne Delta, but intermediate for Sacramento and San Joaquin deltas.
[8] In the first part of the 1926 season, samples were taken at Lindley Ranch Headquarters, Rough and Ready Island, on the opposite bank of Lindley Cut-off.

TABLE 235

PERIODS OF OBSERVATION FOR SALINITY STATIONS, 1924 to 1928, INCLUSIVE

Station	Periods of observation				
	1924	1925	1926	1927	1928
San Francisco, San Pablo and Suisun Bays					
Point Orient	----------	----------	Feb. 10, 1926	Continuously to	date
Point Davis	----------	----------	Feb. 6, 1926	Continuously to	date
Bull Head Point	----------	----------	Feb. 2, 1926	Continuously to	date
Bay Point	----------	----------	Feb. 2, 1926	Continuously to	date
O. and A. Ferry	May 24–Dec. 30	May 12, 1925	Continuously to	date	
Sacramento River Delta					
Collinsville	May 28–Dec. 30	May 10, 1925	Continuously to	date	
Emmaton	June 14–Dec. 30	July 9–Nov. 28	June 16–Dec. 14	Aug. 2–Dec. 10	June 18–Dec. 30
Three Mile Slough Bridge[1]	June 14–Dec. 6	July 24–Dec. 26	June 10–Dec. 22	Aug. 2–Aug. 30	June 18–Dec. 30
Rio Vista Bridge	June 14–Nov. 21	July 28–Oct. 24	June 8–Nov. 22	Aug. 2–Aug. 30	July 18–Nov. 16
Isleton Bridge	July 2–Nov. 20	Aug. 4–Nov. 6	June 30–Oct. 20	----------	Aug. 14–Nov. 6
Liberty Ferry[2]	Aug. 4–Nov. 14	Aug. 22–Nov. 6	July 10–Nov. 10	----------	Aug. 26–Oct. 26
Howard Ferry	Aug. 2–Oct. 26	----------	July 14–Oct. 22	----------	----------
Sutter Slough	July 26–Oct. 30	----------	----------	----------	----------
Little Holland Ferry	Aug. 10–Oct. 6	----------	----------	----------	----------
Grand Island Bridge[3]	Aug. 8–Oct. 30	----------	----------	----------	----------
Walnut Grove	July 18–Oct. 24	----------	Aug. 18–Nov. 26	----------	----------
Paintersville Bridge	----------	----------	Aug. 13–Nov. 18	----------	----------
Hood Ferry	Aug. 10–Oct. 28	----------	----------	----------	----------
Freeport Ferry	Aug. 20–Oct. 6	----------	----------	----------	----------
Mokelumne River Delta					
Southwest Point	----------	----------	July 14–Dec. 2	----------	July 18–Nov. 30
Camp 7	----------	----------	July 30–Nov. 22	----------	----------
Camp 33	July 22–Dec. 16	----------	July 14–Dec. 2	----------	July 18–Nov. 30
Tyler Island Ferry[4]	July 30–Oct. 14	----------	July 22–Oct. 22	----------	----------
Camp 11	July 22–Dec. 16	----------	July 14–Dec. 2	----------	----------
Terminous, Camp 29	----------	----------	July 14–Dec. 2	----------	Aug. 14–Nov. 26
Eagle Tree	----------	----------	July 30–Nov. 22	----------	----------
Camp 25	July 30–Dec. 16	----------	July 14–Nov. 22	----------	----------
New Hope Bridge	----------	----------	July 30–Nov. 22	----------	----------
Camp 20	----------	----------	July 30–Nov. 22	----------	----------

San Joaquin River Delta					
Antioch	May 24–Dec. 30	May 2, 1925	Continuously to date		
Jersey	May 22–Dec. 30	July 10–Jan. 22	June 10–Dec. 22	Aug. 2–Nov. 22	June 18–Dec. 30
Webb Pump	July 16–Nov. 18	July 20–Jan. 22	June 10–Jan. 12	Aug. 6–Nov. 26	July 6–Dec. 6
Holland Pump	July 26–Dec. 26	Aug. 6–Jan. 10	July 2–Dec. 14	----------	July 18–Nov. 10
Central Landing	June 22–Dec. 22	Aug. 6–Nov. 14	June 10–Dec. 10	----------	July 18–Oct. 30
Palm Tract	----------	----------	Aug. 6–Dec. 22	----------	July 18–Nov. 6
Middle River P. O.	Aug. 8–Dec. 30	Aug. 12–Nov. 30	June 30–Dec. 26	----------	July 18–Oct. 30
Mansion House	Aug. 6–Dec. 10	Aug. 12–Feb. 10	July 22–Nov. 14	----------	Aug. 14–Nov. 2
Medford Pump	July 18–Nov. 20	Aug. 4–Oct. 6	----------	----------	----------
King Island, Camp 3½	Aug. 12–Dec. 26	----------	Sept. 22–Nov. 26	----------	Aug. 18–Oct. 30
Mandeville Pump	----------	----------	July 10–Dec. 10	----------	July 22–Oct. 22
Clifton Court Ferry	Aug. 20–Nov. 14	----------	Aug. 18–Oct. 10	----------	----------
Rindge Pump	Aug. 8–Dec. 30	Aug. 12–Feb. 8	July 26–Dec. 22	----------	Aug. 14–Nov. 30
Williams Bridge	Aug. 20–Oct. 20	----------	Aug. 18–Nov. 18	----------	----------
Wakefield Landing	Aug. 18–Dec. 22	----------	----------	----------	----------
Stockton Country Club[5]	----------	----------	Aug. 18–Nov. 30	----------	----------
Mossdale Bridge	Sept. 8–Dec. 2	----------	----------	----------	----------

[1] Prior to 1926 the station was at Three Mile Slough Ferry just below the junction of Three and Seven Mile sloughs.
[2] In 1925 samples were taken at Liberty Farms Company Headquarters on Cache Slough, about 1½ miles upstream from the Ferry.
[3] Bridge removed in 1925.
[4] Not properly in Mokelumne Delta, but intermediate for Sacramento and San Joaquin deltas.
[5] In the first part of the 1926 season, samples were taken at Lindley Ranch Headquarters, Rough and Ready Island, on the opposite bank of Lindley Cut-off.

PUBLICATIONS OF THE

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS

STATE OF CALIFORNIA

When the Department of Public Works was created in July, 1921, the State Water Commission was succeeded by the Division of Water Rights, and the Department of Engineering was succeeded by the Division of Engineering and Irrigation in all duties except those pertaining to State Architect. Both the Division of Water Rights and the Division of Engineering and Irrigation functioned until August, 1929, when they were consolidated to form the Division of Water Resources.

STATE WATER COMMISSION

First Report, State Water Commission, March 24 to November 1, 1912.
Second Report, State Water Commission, November 1, 1912, to April 1, 1914.
*Biennial Report, State Water Commission, March 1, 1915, to December 1, 1916.
Biennial Report, State Water Commission, December 1, 1916, to September 1, 1918.
Biennial Report, State Water Commission, September 1, 1918, to September 1, 1920.

DIVISION OF WATER RIGHTS

*Bulletin No. 1—Hydrographic Investigation of San Joaquin River, 1920–1923.
*Bulletin No. 2—Kings River Investigation, Water Master's Reports, 1918–1923.
*Bulletin No. 3—Proceedings First Sacramento-San Joaquin River Problems Conference, 1924.
*Bulletin No. 4—Proceedings Second Sacramento-San Joaquin River Problems Conference, and Water Supervisor's Report, 1924.
Bulletin No. 5—San Gabriel Investigation—Basic Data, 1923–1926.
Bulletin No. 6—San Gabriel Investigation—Basic Data, 1926–1928.
Bulletin No. 7—San Gabriel Investigation—Analysis and Conclusions, 1929.
*Biennial Report, Division of Water Rights, 1920–1922.
*Biennial Report, Division of Water Rights, 1922–1924.
Biennial Report, Division of Water Rights, 1924–1926.
Biennial Report, Division of Water Rights, 1926–1928.

DEPARTMENT OF ENGINEERING

*Bulletin No. 1—Cooperative Irrigation Investigations in California, 1912–1914.
*Bulletin No. 2—Irrigation Districts in California, 1887–1915.
Bulletin No. 3—Investigations of Economic Duty of Water for Alfalfa in Sacramento Valley, California, 1915.
*Bulletin No. 4—Preliminary Report on Conservation and Control of Flood Waters in Coachella Valley, California, 1917.
*Bulletin No. 5—Report on the Utilization of Mojave River for Irrigation in Victor Valley, California, 1918.
*Bulletin No. 6—California Irrigation District Laws, 1919 (now obsolete).
Bulletin No. 7—Use of water from Kings River, California, 1918.
*Bulletin No. 8—Flood Problems of the Calaveras River, 1919.
Bulletin No. 9—Water Resources of Kern River and Adjacent Streams and Their Utilization, 1920.
*Biennial Report, Department of Engineering, 1907–1908.
*Biennial Report, Department of Engineering, 1908–1910.
*Biennial Report, Department of Engineering, 1910–1912.
*Biennial Report, Department of Engineering, 1912–1914.
*Biennial Report, Department of Engineering, 1914–1916.
*Biennial Report, Department of Engineering, 1916–1918.
*Biennial Report, Department of Engineering, 1918–1920.

* Reports and Bulletins out of print. These may be borrowed by your local library from the California State Library at Sacramento, California.

DIVISION OF WATER RESOURCES

Including Reports of the Former Division of Engineering and Irrigation

*Bulletin No. 1—California Irrigation District Laws, 1921 (now obsolete).
*Bulletin No. 2—Formation of Irrigation Districts, Issuance of Bonds, etc.
Bulletin No. 3—Water Resources of Tulare County and Their Utilization, 1922.
Bulletin No. 4—Water Resources of California.
Bulletin No. 5—Flow in California Streams.
Bulletin No. 6—Irrigation Requirements of California Lands.
*Bulletin No. 7—California Irrigation District Laws, 1923 (now obsolete).
*Bulletin No. 8—Cost of Water to Irrigators in California.
Bulletin No. 9—Supplemental Report on Water Resources of California.
*Bulletin No. 10—California Irrigation District Laws, 1925 (now obsolete).
Bulletin No. 11—Ground Water Resources of Southern San Joaquin Valley.
Bulletin No. 12—Summary Report on the Water Resources of California and a Coordinated Plan for Their Development.
Bulletin No. 13—The Development of the Upper Sacramento River, containing U. S. R. S. Cooperative Report on Iron Canyon Project.
Bulletin No. 14—The Control of Floods by Reservoirs.
*Bulletin No. 18—California Irrigation District Laws, 1927 (now obsolete).
Bulletin No. 18—California Irrigation District Laws, 1929 Revision.
Bulletin No. 19—Santa Ana Investigation, Flood Control and Conservation (with packet of maps).
Bulletin No. 20—Kennett Reservoir Development, an Analysis of Methods and Extent of Financing by Electric Power Revenue.
Bulletin No. 21—Irrigation Districts in California, 1929.
Bulletin No. 22—Report on Salt Water Barrier (two volumes).
Bulletin No. 23—Report of Sacramento-San Joaquin Water Supervisor, 1924–1928.
Biennial Report, Division of Engineering and Irrigation, 1920–1922.
Biennial Report, Division of Engineering and Irrigation, 1922–1924.
Biennial Report, Division of Engineering and Irrigation, 1924–1926.

COOPERATIVE AND MISCELLANEOUS REPORTS

*Report of the Conservation Commission of California, 1912.
*Irrigation Resources of California and Their Utilization (Bul. 254, Office of Exp. Sta., U. S. D. A.), 1913.
*Report, State Water Problems Conference, November 25, 1916.
*Report on Pit River Basin, April, 1915.
*Report on Lower Pit River Project, July, 1915.
*Report on Iron Canyon Project, 1914.
*Report on Iron Canyon Project, California, May, 1920.
*Sacramento Flood Control Project (Revised Plans), 1925.
Report of Commission Appointed to Investigate Causes Leading to the Failure of St. Francis Dam, 1928.
Report of the Joint Committee of the Senate and Assembly Dealing With the Water Problems of the State, 1929.

PAMPHLETS

Rules and Regulations Governing the Supervision of Dams in California.
Water Commission Act with Latest Amendments Thereto.
Rules and Regulations Governing the Appropriation of Water in California.
Rules and Regulations Governing the Determination of Rights to Use of Water In Accordance with the Water Commission Act.
Tables of Discharge for Improved Venturi Flumes.
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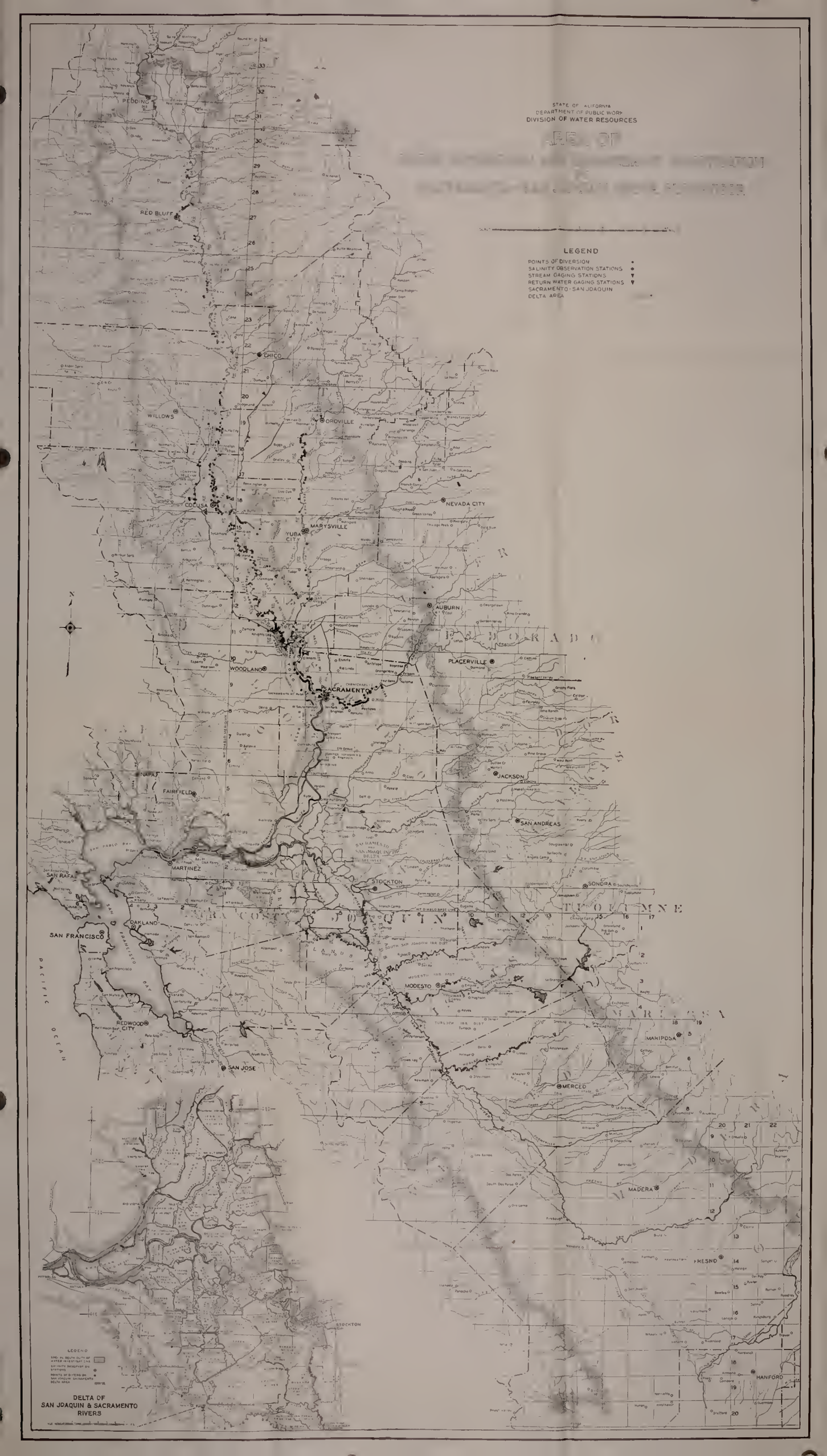
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